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U.S. Army Toxic and Hazardous Materials Agency

TOOELE ARMY DEPOT
PRELIMINARY ASSESSMENT/SITE INVESTIGATION
FINAL REPORT

VOLUME I
NORTH AREA AND FACILITIES AT HILL AIR FORCE BASE

APPENDIXES

DECEMBER 1988

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PREPARED FOR:

U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY
INSTALLATION RESTORATION DIVISION
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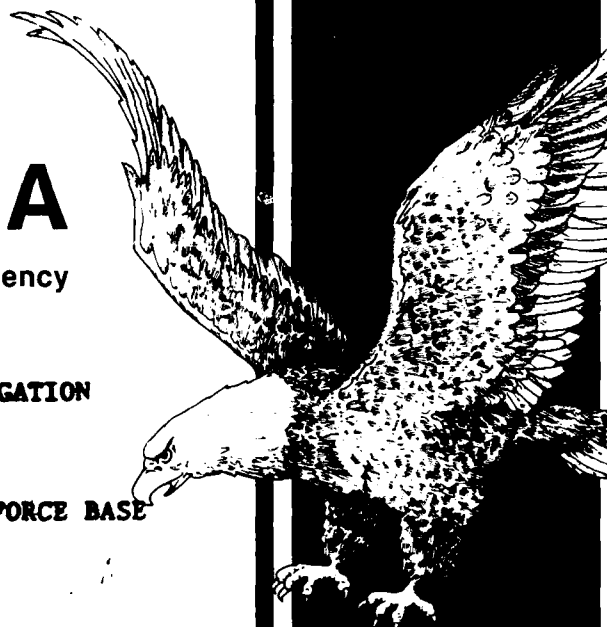
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FINAL REPORT
PRELIMINARY ASSESSMENT/SITE INVESTIGATION
TOOELE ARMY DEPOT, UTAH
VOLUME I - APPENDIXES

Prepared for
U.S. Army Toxic and Hazardous Materials Agency
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December 1988

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CONTENTS

Appendix Number

- I-A U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY GUIDELINES AND FEDERAL REGULATIONS REGARDING PESTICIDE STORAGE AND HANDLING PROCEDURES
- I-B ANALYTICAL DATA FOR DRILLING/DECONTAMINATION WATER:
SUPPLY WELL NO. 3, N-TEAD
- I-C N-TEAD WELL/LYSIMETER COMPLETION DIAGRAMS, BORING LOGS, AND DEVELOPMENT LOGS
- I-D PRODUCT INFORMATION FOR TIMCO LYSIMETERS
- I-E FIELD SURVEYING DATA
- I-F WELL PURGING LOGS
- I-G INSTALLATION RESTORATION DATA MANAGEMENT SYSTEM (IRDMS)
CHEMICAL DATA, DEFINITIONS, AND CERTIFIED REPORTING LIMITS

APPENDIX I-A

**U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY
GUIDELINES FOR FEDERAL REGULATIONS REGARDING
PESTICIDE STORAGE AND HANDLING PROCEDURES**

Effective 3 July 1986

Facilities Engineering

Pest Management

This UPDATE printing publishes a revision which is effective 3 July 1986. Because the structure of the entire revised text has been re-organized, no attempt has been made to highlight changes from the earlier regulation dated 15 December 1980.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

Summary. This regulation on pest management has been revised. It reflects current Army policies, procedures, and standards for pest management at installations under Department of the Army jurisdiction. This regulation also implements Department of Defense Directive 4150.7.

Applicability. This regulation—

a. Applies to all installations and activities (including nonappropriated fund activities) worldwide under control of the Department of the Army, to the Army National Guard, and to the U.S. Army Reserve.

b. Does not apply to the following:

(1) Civil works functions of the Corps of Engineers.

(2) Facilities occupied by Army activities as tenants when real property control is under another military department or Government agency.

(3) State-owned or State-operated (funded) installations or facilities which the Army National Guard uses part-time or full-time.

Impact on New Manning System. This regulation does not contain information that affects the New Manning System.

Internal control systems. This regulation is subject to the requirements of AR 11-2. It contains internal control provisions but does not contain checklists for conducting internal control reviews. These checklists are being developed and will be published at a later date.

Supplementation. Supplementation of this regulation and establishment of forms other than DA forms are prohibited without prior approval from HQDA (DAEN-ZCF-B), WASH DC 20314-1000.

Interim changes. Interim changes to this regulation are not official unless they are authenticated by The Adjutant General. Users

will destroy interim changes on their expiration date unless sooner superseded or rescinded.

Suggested improvements. The proponent agency of this regulation is the Office of the Chief of Engineers. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to HQDA (DAEN-ZCF-B), WASH DC 20314-1000.

Distribution. Distribution of this issue has been made in accordance with DA Form 12-9A-R requirements for AR 420-series publications. The number of copies distributed to a given subscriber is the number of copies requested in Blocks 356 of the subscriber's DA Form 12-9A-R. AR 420-76 distribution is C for Active Army, ARNG, and USAR.

Contents (Listed by paragraph number)

Chapter 1

Introduction

Purpose • 1-1

References • 1-2

Explanation of abbreviations and terms • 1-3

Program objectives • 1-4

Chapter 2

Responsibilities

Chief of Engineers • 2-1

Major Army Command (MACOM) commanders • 2-2

MACOM pest management consultants • 2-3

Installation commanders • 2-4

Facilities engineers • 2-5

Surgeon general • 2-6

Building occupants • 2-7

Installation pest management coordinator • 2-8

Chapter 3

Policy Guidance

Pesticide application • 3-1

Operations • 3-2

Pesticides and equipment • 3-3

Training and certification • 3-4

Environmental quality • 3-5

Nonappropriated fund activities • 3-6

Property leased to the Government • 3-7

Cooperation with other agencies • 3-8

Quarantine • 3-9

Aerial application of pesticides • 3-10

Outleased property • 3-11

Contractual pest management • 3-12

Self-help pest control • 3-13

Nuisance pest control • 3-14

Chapter 4

Procedures For Pesticide Handling, Augmentation Contracts, and Records and Reporting Requirements

Pesticide handling • 4-1

Pesticide disposal • 4-2

Augmentation contracts • 4-3

Records and reporting requirements (RCS DD-M (A&AR) 1080) • 4-4

Appendixes

A. References

B. Guidelines for Reviewing Pest Management Programs

*This regulation supersedes AR 420-76, 15 December 1980. Report Control Symbol DD-MIL (A&AR) 1080 is superseded by RCS DD-M (A&AR) 1080.

Contents—Continued

- C. Minimum Requirements of Installation
Pest Management Plans
- D. Use of Termiticides
- E. Policy and Procedures for the
Acquisition of Pesticides and Pest
Control Equipment
- F. Quality Assurance Evaluator Staffing
- G. Self-Help Pest Control Materials
- H. Annual Approval Request for Aerial
Application Projects (RCS DD-M
(A&AR) 1080)

Glossary

Chapter 1 Introduction

1-1. Purpose

This regulation provides policies, standards, and procedures for pest control activities at U.S. Army installations. It sets minimum levels of pest management operations in real property maintenance activities (RPMA). These operations are compatible with national mandates and for protecting the environment.

1-2. References

Required and related publications and prescribed forms are listed in appendix A.

1-3. Explanation of abbreviations and terms

Abbreviations and special terms used in this regulation are explained in the glossary.

1-4. Program objectives

The objectives of the Army Pest Management Program are as follows:

- a. Develop, start, and maintain safe and effective programs for pest management at each Army installation.
- b. Maintain and protect the health, environmental quality, esthetic values, and ecological balance of the military community by—
 - (1) Protecting real estate investments from depreciation by pests.
 - (2) Complying with environmental protection and improvement policies per AR 200-2.
 - (3) Controlling potential disease vectors when needed.
 - (4) Preventing damage of natural resources by insects or other pests.
- c. Maintain and improve operating personnel competence and skill through periodic training and testing.
- d. Prevent medical or economic pests from being introduced or spread into or throughout the United States, its territories or possessions, or other areas by Army operations.

Chapter 2 Responsibilities

2-1. Chief of Engineers (COE)

The Chief of Engineers will—

- a. Provide technical guidance and program standards to improve the effectiveness and enhance the DA Pest Management Program.
- b. Exercise staff supervision and program management (including regulation promulgation) and provide consultative services on the Army-Wide Pest Management Program.
- c. Advise and assist the Army Staff in development of Department of the Army (DA) plans, policies, and regulations dealing with pest management.
- d. Provide international and interservice representation and liaison with professional

organizations, Department of Defense (DOD), and other Federal agencies to exchange data on pest management.

e. Actively support and participate with the DOD Armed Forces Pest Management Board (AFPMB).

f. Provide professional advice concerning pest management materiel and facilities requirements.

2-2. Major Army command (MACOM) commanders

MACOM commanders will—

- a. Provide command and technical direction for implementing the pest management program at installations under their command.
- b. Designate sufficient pest management consultants (PMCs) to assure that all areas of pest management have professional direction.
- c. If unable to justify PMCs, obtain an intraservice support agreement with a MACOM that is adequately staffed for consultant support.
- d. Coordinate annual installation on-site pest management plan/program review schedules with other MACOMs, the U.S. Army Environmental Hygiene Agency (USAEHA), and other Services with installations in the same geographical area to—
 - (1) Optimize the use of available personnel.
 - (2) Minimize travel costs.

2-3. MACOM pest management consultants

These PMCs will—

- a. Advise on all aspects of pest management operations. This includes the following:
 - (1) Manpower requirements.
 - (2) Operational needs.
 - (3) Minimizing pesticidal environmental impact.
 - (4) Training and certifying pest management personnel.
 - (5) Procedural needs to assure efficient pest control programs.
- b. Coordinate with other agencies to implement environmentally safe and efficient pest management programs.
- c. Coordinate with Army medical authorities to implement their responsibilities as given in AR 40-5.
- d. Prior to procurement, review requisitions and provide written approval to obtain and use pesticides and pesticide dispersal equipment.
- e. Ensure that the following actions are taken:

- (1) Perform annual on-site reviews of installation pest management programs and plans in accordance with appendix B, table 3-1, and the Armed Forces Pest Management Board Technical Information Memorandum (TIM) No. 18.
- (2) Provide recommendations that will result in safer, more economical, and more effective operations to the facilities engineer.
- (3) Coordinate MACOM requirements for Army Medical Department (AMEDD)

professional pest management personnel (PPMP) help in providing on-site reviews of installation pest management and pest surveillance programs with the U.S. Army Health Services Command.

f. Maintain professional proficiency by—

- (1) Attending professional meetings.
- (2) Keeping abreast of new developments reported in professional publications.
- g. Assist in providing on-the-job training for installation pest management personnel to—
 - (1) Select, use, and maintain pest control equipment.
 - (2) Select, prepare, and apply pesticides.
 - (3) Report accurately the usage of these materials.
- h. Maintain record of training and certification status of pesticide applicators and check their activities to determine competence.
- i. Certify pest management personnel in accordance with the DOD Plan for the Certification of Pesticide Applicators.
- j. Review and approve technical provisions of all pest management contracts prior to solicitation of bids.
- k. Provide technical review of all military construction, modification, and repair projects to assure structural pest control requirements are met.
- l. Review and approve installation pest management plans.
- m. Review the installation self-help pest control program and provide guidance to assure that it is effectively accomplished.

2-4. Installation commanders

Installation commanders will—

- a. Determine an installation's position and responsibilities in community-wide pest management regarding quarantine and epidemics.
- b. Maintain liaison with MACOMs about pest surveys and investigations proposed by other agencies.
- c. Establish lessee responsibility for using pesticides on outgrants of military real property.
- d. Initiate requests for aerial application of pesticides as prescribed in AR 40-574.
- e. Designate a pest management coordinator for all installation pest management activities.
- f. Approve and support the installation's pest management plan developed by the facilities engineer and the installation surgeon, and approved by the MACOM PMC.

2-5. Facilities engineers

Installation facilities engineers will—

- a. Prepare a pest management plan for all areas within the installation's responsibility in accordance with paragraph 3-2a.
- b. Supervise and direct pest management operations.
- c. Conduct preventive maintenance and surveillance inspections.
- d. Ensure that operating personnel receive adequate training to achieve required pest management certification.

e. Provide on-the-job training of new operating personnel.

f. Obtain and maintain adequate supplies of pesticides and pesticide dispersal equipment.

g. Assure that all pest management operations are done safely.

h. Decide the phases of pest management to be done by contract, based on existing policies. This includes—

(1) Preparing needed specifications and technical provisions for the contract.

(2) Arranging for the purchasing and contracting officer to obtain contract services.

(3) Assuring that contract operations are done per specifications through continuous inspection by personnel holding a valid Certificate of Competency.

i. Perform all recordkeeping and reporting requirements in this regulation.

j. Inform heads of nonappropriated fund activities—

(1) That applying restricted-use and controlled pesticides at these activities will be done by, or under the direct supervision of, trained and certified personnel.

(2) Of the locations where certification training is given.

k. Assure that pest management operations are conducted so as to minimize any adverse effects on the environment.

l. Cooperate with the installation medical authority by—

(1) Furnishing and maintaining mosquito light traps.

(2) Performing essential pest control operations indicated by results of surveillance of medical and quarantine pests.

(3) Providing all needs to meet health safety criteria, including shops, equipment, and protective gear.

2-6. Surgeon general

a. The medical authority (State adjutant general for the National Guard Bureau) serving the installation will—

(1) Conduct surveillance of pest populations involved in the health of the command and those involved in the U.S. Department of Agriculture quarantine regulations. The

medical authority will provide the facilities engineer the results of the survey activities.

(2) Conduct the installation pesticide monitoring program.

(3) Obtain timely identification and susceptibility status of pests to pesticides as necessary. Furnish this information to facilities engineers to be incorporated into pest management operations.

(4) Establish health and personnel safety criteria for pesticide operations.

(5) Assist the engineer MACOM PMC to conduct on-site installation pest management program reviews.

(6) Provide the certification training of pesticide applicators in accordance with the DOD Plan.

(7) Conduct other responsibilities as required by Federal, DOD, DA, or command directives.

b. Medical PMCs serving on the MACOM staff will perform the responsibilities in paragraph 2-3 as required.

2-7. Building occupants

Occupants of buildings, including family housing, will—

a. Apply good sanitation practices to prevent pest infestations.

b. Apply only those pesticides approved for use by building occupants.

c. Cooperate fully with installation pest management personnel in scheduling major operations, to include preparing the areas to be treated.

d. Obtain, through command channels, MACOM PMC approval before using any contract pest control services.

2-8. Installation pest management coordinator

The coordinator will be a pest management supervisor or PPMP who will—

a. Develop and monitor the installation pest management annual work plan.

b. Coordinate with activities conducting pest surveillance or applying pesticides to ensure all applicable information is recorded and reported per this regulation.

Chapter 3 Policy Guidance

3-1. Pesticide application

Except as specifically exempted below and in paragraphs 3-11, 3-12, and 4-3, only DOD trained and certified personnel will apply pesticides, or application of pesticides will be done by others under their direct supervision.

a. Table 3-1 specifies the minimum number of certified pesticide applicators (in-house or contract) required to perform pest management operations on Army installations. This number is based on the defined pest management workload. Pesticide applicators will be certified in all categories of pest control required for their assigned function or shall work under the direct supervision of a certified supervisor responsible for that function. Pesticide applicators will use pesticides only in accordance with U.S. Environmental Protection Agency (EPA)-approved label directions.

b. All personnel will be trained and certified who—

(1) Perform pest management activities at least 25 percent of their on-duty time.

(2) Apply restricted-use, State licensed, or controlled pesticides.

c. Part-time pesticide applicators (less than 25 percent on-duty time) who do not use restricted-use or controlled pesticides will be trained in—

(1) The safe, efficient, and environmentally sound use of pesticides.

(2) Other integrated pest management techniques.

3-2. Operations

a. Installation pest management programs with the most efficient organization will be established and maintained as a part of the installation real property maintenance program. Professional pest management personnel or certified pesticide applicators will manage these programs. An installation pest management plan will be written and will be reviewed and updated annually for each installation on which either in-house or contractual pest management operations are performed. (See table

Table 3-1
Requirements for installation pest management program

Pest control recognized requirements man-years*	Minimum No. of certified full-time pesticide applicators required	Installation pest management plan	On-site program review
Less than 0.25	None unless restricted use pesticides are used or unusually sensitive environmental conditions exist, including those endangered species	Individual plan not required, included in supporting installation plan	Requirements established by MACOM PMC
0.25 to 0.49	One	Same as above	Same as above
0.50 to 1.49	One	Individual pest management plans required	Annual or biennial
1.50 to 3.99	Two	Same as above	Same as above
4.00 or More	50% of the pest management workforce	Same as above	Same as above

*Multiply the total productive man-years required for the pest management program by a factor of 1.19 to determine the recognized requirement. This factor includes essential time allowance for annual and sick leave, on-the-job training, formal training, mandatory attendance at lectures on safety, security and fire prevention, and required medical examination.

3-1. When in-house services win in a commercial activities review, the in-house operation will be performed in accordance with the most efficient organization as identified in the approved plan.

b. Minimum requirements for installation pest management plans are given in appendix C. The plan will list all program objectives arranged in order of priority according to the potential or actual impact on health, morale, structures, or property. The plan will identify the productive manpower requirements for pest management and will be the basis for the size of the installation pest management staff.

c. The control of each type of pest will be given priority in accordance with its importance at the particular installation involved. In general, priorities of pest control operations will be as shown below. Rearrangement of the order of these priorities by the MACOM PMC is authorized where installation local conditions necessitate such changes.

(1) Control of disease vectors and reservoirs of medical importance.

(2) Control of pests that damage or destroy stored products.

(3) Control of pests that damage or destroy beneficial plants.

(4) Control of undesirable plants.

d. Inspections of all structures for infestations of termites will be based on the relative hazard of subterranean termite infestations in the continental United States as reflected in Home and Garden Bulletin 64, U.S. Department of Agriculture Forest Service. The frequency of inspections will be as follows:

(1) Semiannually in the areas in region I where Formosan and drywood termites exist.

(2) Annually in regions I, II, and III where only subterranean termites exist.

(3) At 2-year intervals in region IV.

e. Inspections outside the continental United States should be based on similar potential hazards, cited in d above. The structures found infested will be treated as soon as possible except for those structures where termite control is prohibited. (See app D.) Control methods and pesticides for termites are in Home and Garden Bulletin 64.

f. All pesticides will be used only in accordance with U.S. Environmental Protection Agency-approved label directions.

g. The use of preventive or scheduled periodic pesticide treatments is prohibited unless specifically approved by the MACOM PMC concerned and based on surveillance information or past pest problems.

h. The efficient use of pest management personnel will be assured by using one pesticide applicator to perform operations that require only one. Justification for use of more than one applicator will be based on criteria such as the examples below.

(1) Operations involving particularly hazardous pesticides in which one applicator might be needed to help the others in

case of accidental exposure. An example of such operations is fumigation.

(2) Training purposes.

3-3. Pesticides and equipment

a. Pesticides and equipment in the Federal Supply Catalogs, Department of Defense section, will normally be used. Use of pesticides other than those registered by the EPA or States and approved for specific application per the label or labeling is not authorized. Direct requests to use pesticides according to specific public health and quarantine exemptions or experimental use permits through the MACOM PMC to HQDA (DAEN-ZCF-B), WASH DC 20314-1000, for review and appropriate action. Pesticides that have been suspended or canceled by EPA will only be used per the suspension or cancellation order and will not be used after the date indicated on the order. To avoid having canceled or suspended pesticides onhand, limit purchases to that which can be used within 90 days.

b. The appropriate MACOM PMC will review and approve proposed projects before acquiring or applying—

(1) Nonstandard pesticides or pesticide dispersal equipment.

(2) State-registered pesticides.

c. Send requisitions for all nonstandard and State-registered pesticides to the appropriate MACOM for review and written approval. Agencies or commands without access to MACOM PMC support may obtain assistance from HQDA (DAEN-ZCF-B), WASH DC 20314-1000. All pesticide requisitions must—

(1) Contain data about the target pest.

(2) Describe the area to be treated.

(3) Give the extent of the area to be treated.

(4) Give the rate of application.

(5) Give the name and certification number of the applicator.

(6) Justify the pesticide's use.

d. Equipment listings are in TM 5-632. Procurement criteria are in AR 420-17. Information about new developments in pesticide dispersal equipment is available from the MACOM PMC.

e. In foreign countries and in other areas in which the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) does not apply, pesticide application will conform with the host country laws, the status of forces agreement (SOFA), or this regulation, whichever is the most stringent.

f. The DOD Armed Forces Pest Management Board approves the introduction or deletion of pesticides or pesticide dispersal equipment in the military supply system. The AFPMB approves all stocking of pesticides and pesticide dispersal equipment in the Army program. Policy and procedures for obtaining this approval are provided in appendix E.

3-4. Training and certification

a. All pesticide applicators who determine the effectiveness or selection and application of pesticides on Army real property

must be periodically trained and certified. The minimum training will be that required by the U.S. Environmental Protection Agency for certification. However, additional training may be required due to circumstances at a particular location or the nature of the work to be done.

b. Pest management training requirements may be fulfilled by successful completion of any DOD, other Federal agency, or State, local, or private pest management training, provided the specific Army needs would be satisfied by the training.

c. Any installation desiring to have their pesticide applicator personnel trained and certified by a method other than the DOD Plan must obtain prior approval from the PMCs of HQDA (DAEN-ZCF-B), WASH DC 20314-1000, and HQDA (DASG-PSP-E), WASH DC 20310-1000. Requests for approval must be justified and will be accompanied by copies of the MACOM PMC-approved installation pest management plan and details on the EPA-approved training and certification program which the installation desires that their personnel attend.

d. Training and certification by the DOD Plan will follow the sequence shown below.

(1) A term of successful on-the-job training.

(2) Successful completion of the correspondence course Basic Pest Control Technology, NTTC course 150. This course is conducted by the Navy Public Works Center, Norfolk, VA 23511. The appropriate MACOM PMC must approve the applications for this course.

(3) Successful completion of a DOD training and certification course.

e. CONUS installation pesticide applicators, including those in Hawaii and Alaska, will be trained in specific courses given at the elements listed below.

(1) U.S. Army Health Services Command.

(2) Sheppard Air Force Base.

(3) Jacksonville Naval Air Station.

(4) Alameda Naval Air Station.

(5) 970th Tactical Airlift Group Spray Branch (for aerial application category only).

f. Quotas for the U.S. Army Health Services Command training will be obtained from the U.S. Army Medical Department Personnel Support Agency, ATTN: SGPE-ED, WASH DC 20324-1200. Contact this office by calling AUTOVON 335-1308/1309 or (202) 475-1308/1309.

g. Training of pesticide applicators at overseas installations will follow the DOD Plan for Certification of Pesticide Applicators, except as follows:

(1) The medical command (MEDCOM) or MACOM PMC will do the training.

(2) Personnel must be trained to apply pesticides according to the host country's laws when they differ from U.S. laws. The most restrictive law for use and disposition of pesticides will be followed.

h. Training will be available in the following EPA/DOD categories.

- (1) Forest pest control (EPA category 2).
- (2) Ornamental and turf pest control (EPA category 3).
- (3) Aquatic pest control (EPA category 5).
- (4) Right-of-way pest control (EPA category 6).
- (5) Industrial, institutional, structural, and health-related pest control (EPA category 7).
- (6) Public pest control (EPA category 8).
- (7) Demonstration and research pest control (EPA category 10).
- (8) Aerial application pest control (EPA category 11).

A DD Form 1826 (Certificate of Competency) and DD Form 1826-1 (Pesticide Applicator Certification Card) will be issued to those who meet the required competency levels, as recommended by the MACOM PMC, for the appropriate categories. The Certificate of Competency will be valid for not more than 3 years. Recertification will require refresher training, a written test, and reassessment of on-the-job competence. DD Form 1826 and DD Form 1826-1 are available to qualified PMCs from the AFPMB, Forest Glen Section, Walter Reed Army Medical Center, WASH DC 20307-5001.

Supervisors and certified applicators will train new personnel on the job. The MACOM PMC may assist in training during technical visits and in special MACOM-sponsored training sessions.

Contractor employees performing pest control work on an Army installation will be certified under a State or EPA plan accepted in the State in which the work is conducted. Additionally, the contractor will provide evidence of training and experience equivalent to that determined by the Army as necessary to satisfy the requirements for performance of the particular pest management activity to be contracted. When the entire pest management function of an installation is performed under contract, the criteria used to determine the ratio of certified applicators will be the same as when performed by Army in-house personnel and described in table 3-1. For other contracts, all contractor personnel working on the installation shall meet the training and certification requirements for categories of pest control to be performed. Successful bidders for contracts shall be afforded the opportunity to receive DOD pest management training on a space available basis at contractor expense.

DOD, State, and EPA-certified pesticide applicators shall be recertified every 3 years.

All personnel using pesticides should keep abreast of current developments through attendance at local and State trade and professional meetings.

3-5. Environmental quality

Pest management operations will be planned and conducted to minimize or eliminate adverse environmental effects. If

required, prepare and process draft documents and final environmental impact statements on time as per AR 200-2.

3-6. Nonappropriated fund activities

Only trained and certified personnel or those under their direct supervision will apply pesticides at nonappropriated fund activities (para 3-1). Contracts for pest control at nonappropriated fund activities will be governed by this regulation.

3-7. Property leased to the Government

a. CONUS and overseas.

(1) Lease instruments will be negotiated to note the responsibilities of the lessor and of the lessee (Government) for accomplishing pest control. In foreign countries, these responsibilities will be predicated on SOFAs, laws, customs, and the practices of the host country. When local laws differ from those of the United States, the most stringent will be followed.

(2) Occupants will keep the leased premises clean and sanitary.

b. CONUS (includes Hawaii and Alaska). Where feasible, the lessor will—

(1) Furnish and keep the leased housing free of pests according to AR 420-71.

(2) Use pesticides and controls that conform to Federal, State, and local regulations for facilities under DA control.

3-8. Cooperation with other agencies

Department of the Army will cooperate with Federal, State, and local government agencies involved with pest management. Coordination with appropriate health care professionals will be accomplished when human health is an issue.

a. *Specialists of other Federal, State, and local agencies.* Specialists will be requested to assist with problems of medical, agricultural, and environmental importance (for example, disease and pest control, fish and wildlife protection, water protection, and hazardous waste disposal). The Federal agencies include, but are not limited to, the following:

(1) U.S. Department of Health and Human Services (Public Health Service).

(2) U.S. Department of Agriculture (plant protection, quarantine, and veterinary services of the animal and plant health inspection services).

(3) U.S. Department of the Interior (Fish and Wildlife Service).

(4) U.S. Treasury Department (Bureau of Customs).

(5) Environmental Protection Agency (Office of Pesticide Programs).

b. *Coordination.* Installations will coordinate environmental assessments (EAs), when required for outdoor applications of pesticides, with appropriate departments and Federal, State, and local agencies. Coordination and requests for other Federal agency assistance will be routed through the MACOM to the appropriate agency. Requirements for environmental assessments or environmental impact statements (EISs)

for certain uses of pesticides are provided in AR 200-2.

c. *Notification.* Installations will notify MACOMs of proposed visits or surveys by representatives of other Federal, State, and local organizations when these visits or surveys relate to quarantine or pesticide issues.

3-9. Quarantine

a. In accordance with AR 700-93 and AR 40-12, all command levels will cooperate fully with Federal agencies responsible for quarantine of agricultural and public health significance.

b. MACOM commanders will ensure that areas to receive any pesticide treatment are limited to the minimum needed to meet quarantine requirements.

c. Installations will procure pesticides, equipment, and other materials needed to comply with quarantine requirements.

3-10. Aerial application of pesticides

Applying pesticides by air will be done per AR 40-574. Prepare an EA, followed by an EIS if needed, before any aerial application is conducted. (See AR 200-2.) Proposed aerial applications must be reported in accordance with paragraph 4-4d.

3-11. Outleased property

Outgrant holders must comply with all animal damage control laws, ordinances, specifications, and rules in land use regulations that are part of the outgrant document. Before starting any compliance program that deviates from the land use regulations, get the MACOM to review and approve details of the program. Where possible, supplemental agreement to existing outgrants, renewed or amended, will make provisions for compliance requirements stated above. (See AR 420-74.)

3-12. Contractual pest management

a. Decisions made on in-house versus contract must agree with current DA commercial activities (CA) directives. (See para 4-3 for augmentation contracts.)

b. Installations in States that provide pesticide training and certification programs having final approval by the EPA will decide on contract or in-house method per effective CA directives. State certification is accepted for competency, and DOD certification is not required for contract operations.

c. MACOM PMC will review and approve technical provisions of all proposed contracts. Commander-in-Chief, U.S. Army Europe, U.S. Army Japan, and Eighth U.S. Army may delegate this approval to qualified pest management personnel.

d. Quality assurance evaluators (QAEs), trained in accordance with the DOD Plan for the Training and Certification of Pesticide Applicators, in the categories of pest control being performed by contract, will monitor and evaluate contractor performance unless a DOD certified pesticide applicator is assisting the QAE. The QAE must

assure contractual work is performed in accordance with performance work statement. Review will include but not be limited to the following actions:

(1) Direct inspection of unopened pesticide containers to verify that chemicals listed on the label—

(a) Meet the contract specifications

(b) Are suitable for the intended use.

(2) Proper disposal of pesticide waste and containers to ensure disposal is in accordance with EPA and DOD requirements.

(3) Observation of measuring, mixing, and application procedures to assure technical adequacy. Guidance for QAE staffing is in appendix F. Random sampling is not a suitable method of quality assurance for pest management contracts.

e. Requirements of this paragraph do not apply to a Government-owned, contractor-operated (GOCO) installation type of contract. Evaluation of the pest control services provided by the contractor operating the installation will be performed by the MACOM PMC conducting the required annual on-site program review.

3-13. Self-help pest control

Installations will establish self-help pest control programs to be accomplished by occupants of military housing (unaccompanied personnel and family housing). This program will be part of the overall installation self-help program and included in the installation pest management plan. Residents of military housing will be advised of the self-help program, the need to practice good sanitation, and their responsibility for the control of minor pest problems. Installation pest management personnel will conduct pest control in military housing only when the pest threatens Government property or the occupants' health, or the occupants have been unable to control the pest after having made a concerted effort. Self-help programs shall include recordkeeping if pesticides are provided to the occupants. (Use DD Form 1532-1 (Pest Management Maintenance Record).) These records will be reviewed by installation pest management personnel before their inspection and treatment of military housing. MACOMs will provide technical guidance for the self help program. The program will include—

a. Provision of appropriate pesticides and pest control equipment (app G).

b. Appropriate oral and written instructions and hands-on training of self-help pest control methods.

c. A specific trained and certified installation pest controller to effectively monitor the program and train self-help supply personnel to—

(1) Recognize the pest to be controlled.

(2) Select the appropriate pest control methods and materials to be used.

(3) Provide instruction to occupants concerning the application of pesticides.

(4) Record, on DD Form 1532-1, the pesticides and equipment issued, occupant's

name, building number, and the pest to be controlled.

3-14. Nuisance pest control

Installation pest management personnel are prohibited from conducting pest control for pests that constitute only a nuisance unless such control is included in the MACOM PMC-approved installation pest management plan. Primary responsibility for control of nuisance pests is with the occupants of military housing and other facilities. PMCs should approve control of only those nuisance pests that adversely affect the installation or morale. Examples of nuisance pests include minor infestations of ants, silverfish, cockroaches, and mice.

Chapter 4

Procedures for Pesticide Handling, Augmentation Contracts, and Records and Reporting Requirements

4-1. Pesticide handling

a. *Use and disposition.* The use and disposition of pesticides will be in accordance with this regulation, AR 40-5, AR 200-2, and appropriate Federal, State, and local regulations. In overseas areas, host country law, SOFA, or U.S. regulations will be followed, whichever is the most stringent.

b. *Mixing and storage facilities.*

(1) Pesticides will be mixed and stored only in facilities where due regard has been given to the hazardous nature of the pesticide, site selection, protective enclosures, and operating procedures and where adequate measures have been taken to assure personnel safety, accident prevention, and detection of potential environmental damages. These facilities will conform to the workplace safety and health requirements in 29CFR1910.105, national, State, and local fire codes, and guidance provided by medical authorities and 40CFR165.10. Design and construction criteria guidance and recommendations for these facilities provided in TIM No. 17 will be implemented to the maximum extent possible.

(2) Pesticide containers will be stored in well-ventilated, dry storage areas and will be protected from freezing temperatures and direct sunlight. Rigid containers will be stored in an upright position. All containers should be stored off the ground with labels plainly visible to permit ready access and inspection. Herbicides and insecticides must be stored separately, maintaining sufficiently safe segregation, with the use of 4-foot aisles, in order to avoid cross-contamination or adverse reactions. Stored pesticides will be inspected monthly to determine the condition of the containers. Leaking containers will be repacked in accordance with paragraph 4-2c.

(3) All items of movable equipment used for handling pesticides and which might be utilized for other purposes shall be labelled "Contaminated with Pesticides" and should

not be removed from the site unless thoroughly decontaminated.

c. *Protective equipment.*

(1) Approved masks, respirators, rubber gloves, rubber boots, and protective clothing will be provided at Government expense and used, as required, during the mixing and application of pesticides. Guidance on recommended protective equipment authorized and available in the military supply system is provided in TIM No. 14. Additional information is available from the MACOM PMC and the USAEHA.

(2) Pesticide-contaminated protective clothing will not be home laundered, but will be laundered at Government expense. Severely contaminated clothing will not be laundered but will be treated as a pesticide-related waste and disposed of in accordance with current regulatory requirements.

d. *Pest management vehicles.* Vehicles with lockable storage areas and separate cabs will be assigned to installation pest management activities for the safe transport of personnel, pesticides, equipment, and supplies for control operations. The transport of pesticides in the cabs of assigned vehicles is prohibited. The use of assigned vehicles for other than pest management purposes is not permitted.

e. *Pesticide spills.*

(1) Pesticide spill kits containing items suitable for the containment and cleanup of pesticide spills will be assembled and placed strategically where pesticides are mixed or stored. In addition, a spill kit will be placed on each vehicle that transports pesticides.

(2) Following a major pesticide spill, immediate action will be taken to contain the spill. It will then be reported in accordance with the installation's National Oil and Hazardous Substances Pollution Contingency Plan or other reporting requirements. Information and assistance regarding pesticide containment and cleanup can be obtained by calling the USAEHA Hazardous Substances Spill Response Team during USAEHA duty hours: Commercial (301) 671-3816 or AUTOVON 584-3816. During USAEHA nonduty hours, call Commercial (301) 671-4375 or AUTOVON 584-4375. Additional information on spill kit contents and decontamination procedures is provided in TIM No. 15.

f. *Pesticide fires.*

(1) The usual hazards presented by a fire are compounded in the case of a pesticide fire by the danger of pesticide poisoning and contamination. Therefore, proper planning and training will be conducted to reduce the risk to personnel and the environment resulting from a fire involving stored pesticides.

(2) The pest management coordinator or the supervisor of the pesticide storage areas will conduct prefire coordination with appropriate fire department and other emergency officials. Prefire plans will be updated annually, or when changes occur in the amount or types of pesticides stored. A copy of this plan with annual updates will

be maintained by the pest management coordinator or pest control supervisor. Copies will also be provided to the local fire department plus other emergency activities (for example, police, hospital, safety office).

(3) Information and guidance on the prevention, control, and cleanup of pesticide fires, to include prefire plans, is provided in TIM No. 16. The plan will include a pesticide inventory, storage area floor plan, evacuation routes, water runoff control, map of the surrounding area, emergency phone numbers, medical assistance, salvage/hazard assessment, and provisions for safety briefings of appropriate personnel.

4-2. Pesticide disposal

a. General.

(1) Every effort will be made to use serviceable pesticides locally for the purpose originally intended.

(2) No pesticide, pesticide container, or pesticide container residue will be disposed of in a manner inconsistent with its label or labeling or in a way to cause or allow—

a. Open dumping

b. Open burning

c. Water or ocean dumping except in conformance with appropriate Federal regulations.

d. Direct exposure which may result in contamination of food or feed supplies.

e. Violation of any applicable Federal, State, or local pollution control standards.

f. Violation of FIFRA and regulations developed pursuant to the Act.

(3) The installation will not store or turn in any pesticide or pesticide-related waste generated by the civilian community.

b. Disposal procedures.

(1) All properly identified excess serviceable or unserviceable pesticides will be turned in to the local or servicing Defense Reutilization and Marketing Office (DRMO) for disposal in accordance with TIM No. 16 and DOD 4160.21-M.

(2) The generating activity will notify the receiving DRMO in writing to arrange for a pre-inspection to ensure that the DRMO has proper storage facilities and adequate space.

(3) Pesticides for turn-in will be in properly labeled containers that are nonleaking and can withstand normal handling.

(4) If the receiving DRMO has a suitable storage facility for pesticides and space is available, the DRMO will physically store the property. If the DRMO does not have suitable storage, the generating activity will store the property until disposition instructions are received from the DRMO. If neither have conforming storages, the activity with the most conforming storage will store the property.

(5) Excess pesticides that cannot be used locally will be turned in to DRMO for reuse or sale only if the container has a complete original EPA approved label on the container and only if the product has not deteriorated or been adulterated. Those pesticides for turn-in which lack proper labels or which have had their compositions altered,

will be labeled FOR DISPOSAL ONLY on the container by the generating activity. The generating activity is not authorized to modify existing pesticide labels of pesticides for turn-in or to affix any new, revised, or reused labels to the container without the written permission of the pesticide manufacturer.

c. Recontainerization of pesticides.

(1) Pesticides in deteriorated or leaking containers will be recontainerized or overpacked in approved containers. Pesticides that are recontainerized or overpacked for turn-in to DRMO must be in containers that meet Department of Transportation (DOT) specifications. Examples of approved containers for repackaging leaking containers are shown below.

(a) Five gallon—national stock number (NSN) 8110-00-282-2520, drum, metal; new; 22 USS sheet metal gage steel; enamel exterior; nonremovable ends, 139/16 in. outside H, 11.25 in., OD; 5 gallon normal filled capacity, bail attached to top; spout; FED PPP-D 729, Type I.

(b) Fifty-five gallon—NSN 8110-00-597-2353, drum, shipping and storage; 16 USS sheet metal gage steel; enamel exterior; nonremovable cover, 35/16 in. outside H 237/16 in., OD; 55 gallon capacity two expanded outward rolling hoops; bung and vent located in end; reusable; FED PPP-D-729, Type I.

(2) When repackaging liquid pesticides, the interior surface of each metal drum, NSN 8110-00-282-2520 or NSN 8110-00-597-2353, or equivalent shall be completely lined with two coats, 0.0015 inch total thickness, of bisphenol epoxide and phenol-formaldehyde resins mixture conforming to MIL-S-122760, Type III, class optional.

(3) Repackaged pesticide turned in to DRMO will be considered unserviceable and the new container or overpack will be labeled with the following information:

(a) "NSN—repackaged" (if applicable).

(b) Nomenclature and percent active ingredient.

(c) Type and quantity of rinse solution or contamination (if applicable).

(d) Total quantity in gallons (liquids) or pounds (solids).

(e) Date repackaged (month/year).

(f) The phrase "FOR DISPOSAL ONLY."

d. Rinsing of pesticide containers.

(1) Empty pesticide containers containing small amounts (1 inch or less) of liquid pesticide will be drained for 1 minute into the spray or mix tank. The container will then be rinsed three times, each time using a volume of appropriate diluent equal to approximately 10 percent of the container capacity. The rinse liquid will be used as a diluent for future pesticide use or will be stored and disposed of in accordance with Federal, State, or local requirements for handling a pesticide-related waste.

(2) Empty and rinsed pesticide containers will not be reused by the installation for

any purpose. Containers will be recycled through a registered drum reconditioner, returned through DRMO to the pesticide manufacturer or formulator for refilling with the same chemical class of pesticide, recycled as scrap metal through a metal reclaiming company, crushed, or otherwise rendered unusable and buried in a sanitary landfill in conformance with Federal, State, and local requirements.

4-3. Augmentation contracts

a. Augmentation contracts should be used when the essential pest management activities cannot be performed by the existing pesticide applicator staff. These contracts shall be awarded only after the appropriate MACOM PMC has verified in writing that the contract will provide necessary services beyond the capability of the in-house staff. Contracts meeting the above requirements for supplementing in-house pest management activities will be executed, when required, according to existing procurement regulations and the following guidelines:

(1) The services are economically beneficial to the Government and certified contractors are available.

(2) Application by trained and certified facilities engineering personnel is not feasible because of remote location, project size, or manpower, time, or equipment limitations.

b. Examples of augmentation contracts include—

(1) Single applications of fumigants for entire buildings or other large enclosures.

(2) Aerial or special equipment applications over large areas such as mosquito breeding areas.

(3) Wood treatment projects, such as groundline treatment of utility poles.

(4) Extensive termite control.

(5) Other operations which facilities engineering personnel cannot do with in-house resources.

c. The facilities engineering office, in cooperation with the installation medical authority, will prepare technical requirements for all pest management contracts. The facilities engineer will send project plans and specifications to the appropriate MACOM PMC for review and approval. This approval must be obtained before a request is made for service from commercial sources.

d. Technical provisions will specify only the pesticides approved by the MACOM PMC and registered by EPA.

e. The contractor must submit proof that supervisory and applicator personnel to be employed on the contract will—

(1) Meet the State certification standards set in response to EPA's implementation of FIFRA or competency requirements outlined in the DOD Plan for Training and Certification of Pesticide Applicators.

(2) Provide safe working conditions for personnel and installations occupants.

f. Inspect the contract per paragraph 3-12d.

4-4. Records and reporting requirements (RCS DD-M (A&AR) 1080)

a. Adequate records of all pest management operations performed by engineer personnel, contractors, nonappropriated fund activities, self-help, lessee, and installation medical authority (preventive medicine and veterinary) will be maintained by the installation engineer.

b. All Army installations will maintain complete daily pesticide application and surveillance records using DD Form 1532-1. These records will account for all operations and will provide a permanent historical record of pest control operations and pesticides for each building, structure, or outdoor site. DD Form 1532-1 is available through normal publications supply channels.

c. DD Form 1532 (Pest Management Report) will be used by the installation engineer to report all pesticide use and pest control operations. DD Form 1532 is available through normal publications supply channels.

(1) Each installation or subinstallation performing pest control will submit the reports monthly or in accordance with MACOM requirements. Copies will be distributed within 15 days after the report period according to instructions on the back of DD Form 1532 and as follows:

- (a) The appropriate MACOM PMC.
- (b) The installation medical authority.
- (c) USAEHA, ATTN: HSHB-RP-MO, Aberdeen Proving Ground, MD 21010-5422.

(2) OCONUS installations will distribute DD Form 1532 in accordance with MACOM PMC instructions.

(3) These reports will include pest control operations conducted by the following:

- (a) Facilities engineer.
- (b) Contractors.
- (c) Government-owned, contractor-operated activities.
- (d) Nonappropriated fund activities.
- (e) All outgrant lease holders.
- (f) Installation self-help pest control activities.

(4) The reports will include pest surveillance conducted by the following:

- (a) Facilities engineer pest management personnel.
- (b) Installation veterinarian.
- (c) Installation preventive medicine personnel.

(5) PMCs will review the report data to evaluate the efficiency of the installation pest management operations and determine if the installation pest management plan is being conducted effectively. PMCs will also review the DD Form 1532 for accuracy and correct use of terms.

d. Each year, installations will prepare a report of anticipated installation pest management programs or projects that involve application of pesticides by aircraft. The report will describe all anticipated aerial application programs for a 1-year period (1 April through 31 March). Submit reports to

HQDA (DAEN-ZCF-B), WASH DC 20414-1000, by 1 December preceding the period of planned application. MACOM PMCs who are certified in accordance with the DOD Plan for the Training and Certification of Pesticide Applicators for aerial application pest control may approve the projects without submission to HQDA. Appendix H provides guidance on the information needed to complete this report.

Appendix A References

Section I Required Publications

AR 40-5

Preventive Medicine. (Cited in para 4-1a.)

AR 40-12

Medical and Agricultural Foreign and Domestic Quarantine Regulations for Vessels, Aircraft, and other Transports of Armed Forces. (Cited in para 3-9a.)

AR 40-574

Aerial Dispersal of Pesticides. (Cited in para 3-10.)

AR 200-2

Environmental Protection, and Enhancement. (Cited in paras 1-4b(2), 3-5, 3-8b, and 4-1a.)

AR 415-35

Minor Construction. (Cited in para D-2.)

AR 420-10

Facilities Engineering: General Provisions, Organization, Functions, and Personnel. (Cited in para D-2.)

AR 420-17

Real Property and Resource Management. (Cited in para 3-3e.)

AR 420-71

Leased Premises. (Cited in para 3-7b(1).)

AR 420-74

Natural Resources: Land, Forest, and Wildlife Management. (Cited in para 3-11.)

AR 700-93

Processing and Shipping DOD Sponsored Retrograde Materiel Destined for Shipment to the United States, its Territories, Trusts and Possessions. (Cited in para 3-9a.)

DOD Plan

DOD Plan for the Training and Certification of Pesticide Applicators. (Cited in para 3-4g.) (Available from the DOD Armed Forces Pest Management Board, Forest Glen Section, Walter Reed Army Medical Center, WASH DC 20307-5001.)

Home and Garden Bulletin 64

Subterranean Termites—Their Prevention and Control in Buildings. (Cited in para 3-2e.) (Available from the Superintendent of Documents, U.S. Government Printing Office, WASH DC 20412.)

TIM No. 14

Protective Equipment for Pest Control Personnel. (Cited in para 4-1c(1).) (Available from the DOD Armed Forces Pest Management Board, Forest Glen Section, Walter

10

Reed Army Medical Center, WASH DC 20307-5001.)

TIM No. 15

Pesticide Spill Prevention and Management. (Cited in para 4-1e(2).) (Available from the DOD Armed Forces Pest Management Board, Forest Glen Section, Walter Reed Army Medical Center, WASH DC 20307-5001.)

TIM No. 16

Pesticide Fires: Prevention, Control, and Cleanup. (Cited in para 4-1f(3).) (Available from the DOD Armed Forces Pest Management Board, Forest Glen Section, Walter Reed Army Medical Center, WASH DC 20307-5001.)

TIM No. 17

Pest Control Facilities. (Cited in para 4-1b(1).) (Available from the DOD Armed Forces Pest Management Board, Forest Glen Section, Walter Reed Army Medical Center, WASH DC 20307-5001.)

TIM No. 18

Guide for Installation Pest Management On-Site Reviews. (Cited in para 2-3e.) (Available from the DOD Armed Forces Pest Management Board, Forest Glen Section, Walter Reed Army Medical Center, WASH DC 20307-5001.)

TM 5-632

Military Entomology Operational Handbook. (Cited in para 3-3e.)

Section II

Related Publications

A related publication is merely a source of additional information. The user does not have to read it to understand this regulation.

AR 385-32

Protective Clothing and Equipment.

TB MED 223

Respiratory Protective Devices.

Section III

Prescribed Forms

DD Form 1532

Pest Management Report. (Prescribed in para 4-4c.)

DD Form 1532-1

Pest Management Maintenance Record. (Prescribed in para 3-13.)

DD Form 1826

Certificate of Competency. (Prescribed in para 3-41.)

DD Form 1826-1

Pesticide Applicator Certification Card. (Prescribed in para 3-41.)

3 JUNE 1986 UPDATE • AR 420-76

Appendix B

Guidelines for Reviewing Pest Management Programs

B-1. The guidance in this appendix will—

- a. Assist PMCs in the conduct of annual on-site program reviews required at all major Army installations.
- b. Maximize utilization of all PMCs. (MACOM, USAEHA, and other military departments) performing program reviews.
- c. Ensure maximum benefits are obtained from program reviews.

B-2. The following will be accomplished:

- a. Before the start of each fiscal year, the MACOM will determine priorities for installation pest management programs needing review. The priority listing will be coordinated with pest management program reviews conducted by USAEHA and the other military departments.
- b. Program reviews will not be conducted by the MACOM, USAEHA, and other military departments on the same installation during the same 12-month period.
- c. Before reviewing a program, the agency conducting the review will contact other interested agencies to coordinate problem areas to be evaluated.
- d. When the annual on-site review is performed by personnel from a single professional interest (for example, entomology), coordination with other MACOM/USAEHA professionals (for example, agronomists, foresters, wildlife biologists) will be accomplished to assure all aspects of the program are reviewed. Prepare a checklist of known problem areas and special interest items before each review.
- e. Trip reports containing recommendations to correct deficiencies and implement safer, more economical, efficient, and effective operations, will be forwarded by command letters requiring that necessary corrective measures be accomplished. The trip reports and implementing command letters will be completed and forwarded to the installation as soon as possible after the review.
- f. The agency (MACOM, USAEHA, or other military department) reviewing a program will provide a copy of its report to the other agency (MACOM or USAEHA) for information and necessary action. Reports of visits by any MACOM PMC will be provided to HQDA (DAEN-ZCF-B), WASH DC 20314-1000.
- g. When deficiencies in a pest management program are noted, the agency responsible (MACOM engineer/medical authority) will direct the installation commander to correct the deficiency and provide a followup report within 120 days.

B-3. Pest management consultants shall conduct annual on-site program reviews using the guidance provided in this regulation

and in the AFPMB TIM No. 18. These reviews will ensure that the program is being conducted in accordance with the MACOM-approved installation pest management plan. Installations or activities with pest control requirements of such a small scale that plans and on-site reviews are not required by table 3-1 will be included in the plans and on-site reviews of the installation that provides maintenance and logistic support.

B-4. As the result of an on-site review, the MACOM concerned may place an installation on a biennial cycle of on-site program reviews if during the calendar year, the installation—

- a. Was found to be in compliance with the requirements of this regulation, including having a MACOM-approved annual pest management plan.
- b. Received no serious complaints from Federal, State, or local pest management/environmental regulatory agencies.
- c. Experienced no arthropod-borne disease transmission to humans that may have been caused by a program deficiency.
- d. Had no major pesticide-related incidents (such as fire, contamination of buildings or environment, reportable spill, or poisoning).
- e. Had no pest-caused losses to structures or materials exceeding \$5,000.

Appendix C Minimum Requirements of Installation Pest Management Plans

C-1. All basic elements listed in this appendix will constitute the basic plan. Other information needed for program identification or evaluation may be included as appendixes to the basic plan.

C-2. All pest control requirements of the installation and satellite sites will be defined. The content of the suggested workload definition worksheet at attachment 1 is considered the minimum to be used in describing each pest control requirement. A separate worksheet will be prepared for each target pest and will be updated annually for each installation.

C-3. Staffing requirements to accomplish the pest management workload will be identified and will ensure the most economical staffing and maximum use of personnel. The minimum staffing requirements will be attached as an appendix to the basic plan. Updating should only reflect the changes to the plan.

C-4. All pest control functions that can be accomplished more economically through commercial contracts will be identified. An analysis showing the cost comparison of accomplishing pest control by Army employees instead of by commercial contract will be attached as an appendix to the basic plan.

C-5. Pest management consultants shall give special attention to any pesticide application that—

- a. Uses a restricted-use pesticide.
- b. Uses any pesticide that may significantly contaminate surface or ground water.
- c. Includes 259 or more contiguous hectares (640 acres) in one pesticide application.
- d. May adversely affect endangered or other protected species or habitat.
- e. Involves aerial application of pesticides.

C-6. Attachment 1 will be the pest control workload definition worksheet. It will contain the following:

- a. Objective (what and why).
 - (1) Target pest, life stage, or stages.
 - (2) Purpose.
- b. Surveillance (who, how, where, and when).
 - (1) Responsible organization or official.
 - (2) Techniques and procedures.
 - (3) Location or locations (specify).
 - (4) Schedules.
- c. Treatment or control to be applied (who, how, where, and when).
 - (1) Responsible organization or official.
 - (2) Nonchemical controls (e.g. biological, cultural, or mechanical).

- (a) Type.
- (b) Method of application.
- (c) Treatment (preventive or corrective).
- (d) Location or locations to be treated.

(For each specific site, include units to be treated, number of applications, criteria that trigger pesticide applications, schedule of treatment, and climatic conditions.)

- (3) Pesticides.
 - (a) Common name.
 - (b) EPA registration number.
 - (c) Formulation.
 - (d) Concentration of active ingredients.
 - (e) Source or NSN.
 - (f) Application data.
 1. Finished formulation.
 2. Use strength.
 3. Diluent.
 4. Rate (for example, pounds/acre).
 5. Method of dispersal.
 6. Treatment (preventive or corrective).
 - (g) Location or locations to be treated.

(For each specific site, include units to be treated, number of applications, schedule of treatment, and climatic conditions.)

- d. Sensitive areas. These will be—
 - (1) Treated with caution.
 - (2) Avoided (by either nonchemical or chemical controls).
- e. Special health and safety measures required.

f. Any control procedures that require PMC approval or coordination with the AFPMB.

g. Remarks. (For example, special disease vector control requirements.)

h. Manpower requirement for prevention or control of the target pest based upon the program detailed above. (Include the method used to identify the personnel requirement.)

Appendix D Use of Termiticides

D-1. Treatment with termiticides to protect buildings from subterranean termite damage is required during construction in geographical areas where subterranean termites are known to exist. However, termiticide treatment under buildings of certain structural designs may pose a potential health risk if the chemical is inadvertently introduced into occupied areas. Therefore, new construction must comply with the following criteria in areas where termite infestations exist:

a. No duct work or vent/flue that connects to heating, ventilation, or air-conditioning (HVAC) equipment will be located in the following areas:

- (1) In or under slabs on grade.
- (2) In enclosed spaces that are exposed to the ground.

(3) In direct contact with the ground.

b. Enclosed spaces that are exposed to the ground will not be used as a plenum that connects to any HVAC equipment.

c. Condensate drain pipes from HVAC equipment will not be terminated in any enclosed space that is exposed to the ground.

D-2. Structures not complying with the criteria in paragraph D-1 will not be treated with soil incorporated termiticides until the HVAC systems have been modified to meet those criteria and have determined that the systems are not amenable to termiticide intrusion. All modifications to HVAC systems will be in accordance with AR 420-10 and AR 415-35. This procedure applies to existing buildings used for the following purposes:

- a. Family housing units.
- b. Unaccompanied personnel housing.
- c. Child care centers.
- d. Hospitals.
- e. Criminal detention facilities.
- f. Commissaries.
- g. Other types of buildings where 8-hour exposure could occur.

D-3. Any termiticide registered by EPA may be used in the Army termite control program, but such usage will be under the constraints cited in paragraphs D-1 and D-2. State and local restrictions may be factors in determining the choice of chemical. Termiticide applications to Army buildings will be made only by certified personnel and in accordance with approved label directions.

Appendix E

Policy and Procedures for the Acquisition of Pesticides and Pest Control Equipment

E-1. The Armed Forces Pest Management Board will—

a. Be the single point of contact for, and maintain liaison with, other Government agencies in all professional and technical matters involving pesticides and pest control equipment.

b. Introduce and standardize pesticides and pest control equipment except pest control equipment designated for military field units, which are the responsibility of the military departments.

c. Continually evaluate pesticides and pest control equipment in the supply system.

d. Coordinate with the appropriate commodity integrated material managers (CIMMs) for the introduction, revision, and deletion of pesticides and pest control equipment.

E-2. The appropriate CIMM will submit cataloging actions only for pesticides and pest control equipment that has been approved by the AFPMB. Unapproved pesticides or pest control equipment will be referred to the AFPMB for consideration.

E-3. The Army will request approval of stocking of pesticides and pest control equipment through command channels to the AFPMB. Such request will include the necessary technical and supply management information. Once approved by the AFPMB, the request will be given to the CIMM for cataloging action. Proposals recommending revision to and deletion of pesticides or pest control equipment from the supply system will be submitted to the AFPMB in the same manner.

E-4. Except as specifically authorized in this regulation, the Army will not procure or acquire pesticides or pest control equipment that has not been approved by the AFPMB. The Army may not request adoption of pesticides or pest control equipment in the wholesale DOD supply system. National stock numbers will not be assigned to pest management materials that have not been approved by the AFPMB.

E-5. When approved by the MACOM PMC, pesticides and pest control equipment may be procured locally if needed for an emergency, required due to unique local conditions, or used in quantities so small that assignment of an NSN is not feasible. Installations will make every effort to use pesticides and pest control equipment in the Federal Supply Catalog before requesting local purchase authority. MACOM PMCs

will provide to the AFPMB, through command channels, memorandums listing all locally procured pesticides or pest control equipment they have approved. The memorandums will include the amount purchased, the proposed use, and any other information required by the AFPMB.

E-6. The AFPMB shall base its decisions on data from all available sources. When additional testing and evaluation are required, the Naval Medical Command, WASH DC, shall provide data on use efficacy and military application of commercial equipment. The U.S. Army Medical Department will provide data on engineering and durability.

Appendix F Quality Assurance Evaluator Staffing

F-1. Quality assurance is a method used to evaluate contract services to determine whether they meet the requirements of a contract. A QAE is defined as an inspector trained in accordance with the DOD Plan for the Training and Certification of Pesticide Applicators, and who protects the Government's interest through performance evaluation of commercial pest control contracts by on-site surveillance of work performed. QAE staffing should be based on a number of factors such as shown below.

- a. The number of pest control operations requiring 100 percent inspection.
- b. The number of different functions being performed simultaneously.
- c. The size of the contract (productive man-years of pest control work required).
- d. The level of surveillance required for each operation.

F-2. Table F-1 may be used to determine the minimum number of QAEs needed if random sampling is used as the primary method of surveillance.

Table F-1
Determination of QAE needs

Surveillance level	Productive work (man-years)	Number of QAEs
Reduced	0.25-8	1
	8 -	2
Normal	0.25-3	1
	4-6	2
	6 -	3
Increased	1	1
	2	2
	3-5	3
	6-10	4
	11 -	5

F-3. Reduced surveillance levels are established and maintained only with a proven record of acceptable contractor performance. The normal surveillance level will be used for contracts if the Government has no history of contractor performance. The number of QAEs may have to be increased if several different functions must be performed simultaneously.

F-4. Each pest control function and task will be considered separately to determine QAE needs. Assistance from a MACOM PMC is recommended to determine the appropriate number of QAEs. DA manpower regulatory documents or other publications designed to determine QAE staffing also may be used.

Appendix G Self-Help Pest Control Materials

The MACOM PMC, in consultation with the local medical authority, will determine the appropriate pesticides and other materials to be provided for use in installation self-help programs. Materials used will be selected from the following list which includes those considered suitable for self-help issue:

- a. Insecticide, Amidinohydrazone ("Combat"), cockroach bait station, NSN 6840-01-180-0167, EPA Reg. No. 241-264
- b. Insecticide, Aerosol, d-Phenothrin, 12 oz. aerosol can, NSN 6840-01-067-6674, EPA Reg. No. 41019-1.
- c. Aerosolized aero silicagel, with or without insecticide pyrethrum, for use in crack and crevice treatment. (Nonstandard item to be obtained by local purchase.)
- d. Boric acid powder, 98 percent minimum concentration, for use in crack and crevice treatments for control of cockroaches and other arthropods. (Nonstandard item to be obtained by local purchase.)
- e. Trap, roach, NSN 3740-01-096-1632, for use in cockroach surveillance.
- f. Sticky trap, mouse. (Nonstandard item to be obtained by local purchase.)
- g. Mouse trap, spring, NSN 3740-00-252-3384.
- h. Swatter, fly, NSN 3740-00-252-3383.

Appendix H
Annual Approval Request for
Aerial Application Projects (RCS
DD-M (A&AR) 1080)

H-1. Introductory information for an aerial application validation statement will include the following:

- a. Army activity preparing the request.
- b. Date of preparation.
- c. Surveyed installation.
- d. Purpose of the program or project.
- e. Dates of the validation survey.
- f. Period that the validation survey report covers (beginning and ending dates).
- g. Authority of the validating agency.
- h. Name of the pest management professional preparing the statement.

H-2. The body of the validation statement will include complete information on each of the following topics:

- a. Pests and the life stages to be controlled.
- b. Importance of the problem in relation to disease transmission in the geographic locale of concern or importance of protection against damage or destruction of real property, forests, ornamental plantings, or turf.
- c. Effect of the infestation on the morale and efficiency of personnel.
- d. Importance of protection in maintaining the installation's operational capabilities.
- e. Geographic location (nearest town, county, and State) and specific description of the area to be treated including—
 - (1) Size of the area.
 - (2) Operational area or areas affected (for example, recreation, residential, commercial, or industrial).
 - (3) Population size and distribution affected.
 - (4) Natural resources affected (for example, wildlife communities, agricultural or livestock areas, or vegetative cover).
 - (5) Topography of the area.
 - (6) Water resources affected (for example, aquatic areas, drainage patterns, or potable water supplies).
 - (7) Pest breeding areas.
 - (8) Pertinent climatological data.
 - (9) Relationship of the target area to the surrounding environs.
- f. Estimated number of applications and approximate dates of application.
- g. Pesticide and dosage to be used. Information provided will include—
 - (1) Pesticide of choice, its NSN and EPA registration number, and formulation.
 - (2) Dosage, general toxicity, and target and nontarget toxicity.
 - (3) Persistence and degradation characteristics.
 - (4) Method of application (for example, type of aircraft, altitude, airspeed, and spray swath).
 - (5) Previous use of pesticides in the area (including aerial application).

h. Consideration of alternative methods. Sound, definitive criteria will be used for the determination that aerial application is a valid requirement. Compare and contrast the results of not using aerial application (for example, elimination of pest breeding and harborage areas, using ground application equipment, biological control techniques, or repellents).

i. Sensitive areas to be avoided or treated with caution (crop lands, lakes, rivers, streams, or protected species habitats).

j. Federal, State, and local coordination. (Indicate both administrative coordination and the degree of coordination with appropriate pest management programs in adjacent areas.)

k. Whether application will be accomplished with DOD resources or by contract.

l. Surveillance criteria.

m. Type of environmental documentation prepared and date completed.

Glossary

Section I Abbreviations

AFPMB
Armed Forces Pest Management Board

AMEDD
Army Medical Department

CA
commercial activities

CIMM
commodity integrated material managers

CONUS
continental United States

DA
Department of the Army

DOD
Department of Defense

DRMO
Defense Reutilization and Marketing Office

EA
environmental assessment

EIS
Environmental Impact Statement

EPA
Environmental Protection Agency

FIFRA
Federal Insecticide, Fungicide, and Rodenticide Act

GOCO
Government-owned, contractor-operated

HQDA
Headquarters, Department of the Army

HVAC
heating, ventilation, or air conditioning

MACOM
major Army command

NSN
national stock number

OCONUS
outside continental United States

PMC
pest management consultant

QAE
quality assurance evaluator

RPMA
real property maintenance activities

SOFA
Status of Forces Agreement

TIM
technical information memorandum

USAEHA
U.S. Army Environmental Hygiene Agency

Section II Terms

Direct supervision
Supervision by a certified pesticide applicator at the specific location where the work is conducted and maintaining a line-of-sight view of the work performed. Direct supervision is required during the application of restricted use or State limited use and controlled pesticides.

Integrated pest management
A comprehensive approach to pest control or prevention that considers various chemical, physical, and biological suppression techniques; the habitat of the pest; and the interrelationship between pest populations and the ecosystem.

Nonstandard pesticides and pest control equipment
Includes all pesticides and equipment not listed in Supply Catalogs C6800IL and C3740/50IL. These items can be purchased locally after the MACOM PMC has given written approval.

On-site supervision
Supervision that includes being physically located on the installation, but not necessarily at the specific work site; during the work performance and being able to be contacted; and at the work site within 30 minutes.

Pests
Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, and other organisms (except for human or animal disease causing organisms) that adversely affect the well being of personnel and animals; attack real property, supplies, or equipment, or vegetation; or are otherwise undesirable.

Pesticide
Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests; also, any substance or mixture of substances used as a plant regulator, defoliant, or desiccant.

Pesticide applicator
Any individual who applies pesticides or supervises the use of any pesticide by others.
a. DOD certified pesticide applicators. Military or civilian personnel certified in accordance with the DOD Plan for the Training and Certification of Pesticide Applicators.

b. EPA certified pesticide applicators. Personnel certified by the EPA (in States without an approved certification plan) in accordance with 7 USC 136 and in the category in which a pesticide will be applied.

c. State certified pesticide applicator. Persons certified in accordance with 7 USC 136 by a State with an EPA approved certification plan and certified in the category in which the pesticides will be applied.

d. Uncertified pesticide applicators. DOD or contractor employees who work under the supervision of a DOD, EPA, or State certified pesticide applicator, or who apply only pesticides authorized for use by uncertified personnel.

Pest control quality assurance evaluators
Inspectors who are trained in accordance with the DOD Plan for the Training and Certification of Pesticide Applicators and who protect the Government's interest through performance evaluation of commercial pest control contracts.

Pest management consultant
Medical or engineer professional pest management personnel who implement policy and provide guidance for the conduct of installation pest management operations. PMCs are on the staff of Army headquarters and major command medical or engineer activities. MACOM PMCs serve the MACOMs as pest management program managers.

Professional pest management personnel
Personnel with college degrees in biological or agricultural sciences who are in a current assignment that includes pest management responsibilities exercised regularly. DA civilian employees will also meet appropriate Office of Personnel Management qualification standards.

Reportable spill
A release to the environment of a substance as designated under the Clean Water Act, Toxic Substances Control Act, Resource Conservation Recovery Act, or the Comprehensive Environmental Response Compensation and Liability Act. Reportable spill events will be reported to appropriate authorities as required by Federal, State, and Army regulations.

Restricted use pesticide
A pesticide that the Administrator of the EPA or a State regulatory agency determines in accordance with 7 USC 136 to have potential for causing unreasonable adverse effects on the environment when applied in accordance with its labeling. Therefore, it is necessary to impose additional regulatory restrictions.

Standard pesticides and pest control equipment
Pesticides and pest control equipment, standardized, purchased, and stocked as items proven best for use at defense installations.

This includes only EPA registered pesticides and pest control equipment that—

a. Are rated and approved for standardization by the AFPMB.

b. Have an NSN.

c. Are listed in Supply Catalogs C6800IL and C3740/50 IL.

Uncontrolled pesticide

A pesticide available without control through the military supply system or through local purchase. These pesticides may be applied by uncertified personnel.

§ 165.9

the operation and the environmental effects, contingency plans to cope with well failures, and provisions for plugging injection wells when abandoned should be made. The Regional Administrator should be advised of each operation.

(b) Metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds which are discussed in paragraph (c) of this section), should be disposed of according to the following procedures:

(1) After first subjecting such compounds to an appropriate chemical or physical treatment to recover the heavy metals from the hydrocarbon structure, incinerate in a pesticide incinerator as described in paragraph (a)(1) of this section.

(2) If appropriate treatment and incineration are not available, bury in a specially designated landfill as noted in paragraph (a)(2) of this section.

(3) Disposal by soil injection of metallo-organic pesticides should be undertaken only in accordance with the procedure set forth in paragraph (a)(3) of this section.

(4) Chemical degradation methods and procedures that can be demonstrated to provide safety to public health and the environment should be undertaken only as noted in paragraph (a)(4) of this section.

(5) If adequate disposal methods as listed above in this section are not available, the pesticides should be stored according to the procedures in § 165.10 until disposal facilities become available.

(6) Well injection of metallo-organic pesticides should be undertaken only in accordance with the procedures set forth in § 165.8(a)(6).

(c) Organic mercury, lead, cadmium, arsenic, and all inorganic pesticides should be disposed of according to the following procedures:

(1) Chemically deactivate the pesticides by conversion to non-hazardous compounds, and recovery the heavy metal resources. Methods that are appropriate will be described and classified according to their applicability to the different groups of pesticides. Until a list of practical methods is available, however, each use of such

field by the user of the pesticide. Unrinsed containers should be disposed of in a specially designated landfill, or subjected to incineration in a pesticide incinerator.

(c) *Group III Containers.* Containers (both combustible and noncombustible) which formerly contained organic mercury, lead, cadmium, or arsenic or inorganic pesticides and which have been triple-rinsed and punctured to facilitate drainage, may be disposed of in a sanitary landfill. Such containers which are not rinsed should be encapsulated and buried in a specially designated landfill.

(d) *Residue disposal.* Residues and rinse liquids should be added to spray mixtures in the field. If not, they should be disposed of in the manner prescribed for each specific type of pesticide as set forth in § 165.8.

§ 165.10 Recommended procedures and criteria for storage of pesticides and pesticide containers.

(a) *General.* (1) Pesticides and excess pesticides and their containers whose uncontrolled release into the environment would cause unreasonable adverse effects on the environment should be stored only in facilities where due regard has been given to the hazardous nature of the pesticide, site selection, protective enclosures, and operating procedures, and where adequate measures are taken to assure personal safety, accident prevention, and detection of potential environmental damages. These storage procedures and criteria should be observed at sites and facilities where pesticides and excess pesticides (and their containers) that are classed as highly toxic or moderately toxic and are required to bear the signal words DANGER, POISON, or WARNING, or the skull and crossbones symbol on the label are stored. These procedures and criteria are not necessary at facilities where most pesticides registered for use in the home and garden, or pesticides classed as slightly toxic (word CAUTION on the label) are stored. All facilities where pesticides which are or may in the future be covered by an experimental use permit or other special permit are stored should

be in conformance with these procedures and criteria.

(2) Temporary storage of highly toxic or moderately toxic pesticides for the period immediately prior to, and of the quantity required for a single application, may be undertaken by the user at isolated sites and facilities where flooding is unlikely, where provisions are made to prevent unauthorized entry, and where separation from water systems and buildings is sufficient to prevent contamination by runoff, percolation, or wind-blown particles or vapors.

(b) *Storage sites.* Storage sites should be selected with due regard to the amount, toxicity, and environmental hazard of pesticides, and the number and sizes of containers to be handled. When practicable, sites should be located where flooding is unlikely and where soil texture/structure and geologic/hydrologic characteristics will prevent the contamination of any water system by runoff or percolation. Where warranted, drainage from the site should be contained (by natural or artificial barriers or dikes), monitored, and if contaminated, disposed of as an excess pesticide as discussed in § 165.8. Consideration should also be given to containing windblown pesticide dusts or particles.

(c) *Storage facilities.* Pesticides should be stored in a dry, well ventilated, separate room, building or covered area where fire protection is provided. Where relevant and practicable, the following precautions should be taken:

(1) The entire storage facility should be secured by a climb-proof fence, and doors and gates should be kept locked to prevent unauthorized entry.

(2) Identification signs should be placed on rooms, buildings, and fences to advise of the contents and warn of their hazardous nature. In accordance with suggestions given in paragraph (g)(1)(i) of this section.

(3) All items of movable equipment used for handling pesticides at the storage site which might be used for other purposes should be labeled "contaminated with pesticides" and should not be removed from the site unless thoroughly decontaminated.

(4) Provision should be made for decontamination of personnel and equip-

ment such as delivery trucks, tarpaulin covers, etc. Where feasible, a wash basin, and shower with a delayed closing pull chain valve should be provided. All contaminated water should be disposed of as an excess pesticide. Where required, decontamination area should be paved or lined with impervious materials, and should include gutters. Contaminated runoff should be collected, and treated as an excess pesticide.

(d) *Operational procedures.* Pesticide containers should be stored with the label plainly visible. If containers are not in good condition when received, the contents should be placed in a suitable container and properly relabeled. If dry excess pesticides are received in paper bags that are damaged, the bag and the contents should be placed in a sound container that can be sealed. Metal or rigid plastic containers should be checked carefully to insure that the lids and bungs are tight. Where relevant and practicable, the following provisions should be considered:

(1) *Classification and separation.* (i) Each pesticide formulation should be segregated and stored under a sign containing the name of the formulation. Rigid containers should be stored in an upright position and all containers should be stored off the ground. In an orderly way, so as to permit ready access and inspection. They should be accumulated in rows or units so that all labels are visible, and with lanes to provide effective access. A complete inventory should be maintained indicating the number and identity of containers in each storage unit.

(ii) Excess pesticides and containers should be further segregated according to the method of disposal to ensure that entire shipments of the same class of pesticides are disposed of properly, and that accidental mixing of containers of different categories does not occur during the removal operation.

(3) *Container inspection and maintenance.* Containers should be checked regularly for corrosion and leaks. If such is found, the container should be transferred to a sound, suitable, larger container and be properly labeled. Materials such as adsorptive clay, hydrat-

ed lime, and sodium hypochlorite should be kept on hand for use as appropriate for the emergency treatment or detoxification of spills or leaks. (Specific information relating to other spill treatment procedures and materials will be published as it is confirmed.)

(e) *Safety precautions.* In addition to precautions specified on the label and in the labeling, rules for personal safety and accident prevention similar to those listed below should be available in areas where personnel congregate.

(1) *Accident prevention measures.* (i) Inspect all containers of pesticides for leaks before handling them.

(ii) Do not mishandle containers and thereby create emergencies by carelessness.

(iii) Do not permit unauthorized persons in the storage area.

(iv) Do not store pesticides next to food or feed or other articles intended for consumption by humans or animals.

(v) Inspect all vehicles prior to departure, and treat those found to be contaminated.

(2) *Safety measures.* (i) Do not store food, beverages, tobacco, eating utensils, or smoking equipment in the storage or loading areas.

(ii) Do not drink, eat food, smoke, or use tobacco in areas where pesticides are present.

(iii) Wear rubber gloves while handling containers of pesticides.

(iv) Do not put fingers in mouth or rub eyes while working.

(v) Wash hands before eating, smoking, or using toilet and immediately after loading, or transferring pesticides.

(vi) Persons working regularly with organophosphate and N-alkyl carbamate pesticides should have periodic physical examinations, including cholinesterase tests.

(f) *Protective clothing and respirators.* (1) When handling pesticides which are in concentrated form, protective clothing should be worn. Contaminated garments should be removed immediately, and extra sets of clean clothing should be maintained nearby.

Environmental Protection Agency

(2) Particular care should be taken when handling certain pesticides to protect against absorption through skin, and inhalation of fumes. Respirators or gas masks with proper canisters approved for the particular type of exposure noted in the label directions, should be used when such pesticides are handled.

(g) *Fire control.* (1) Where large quantities of pesticides are stored, or where conditions may otherwise warrant, the owner of stored pesticides should inform the local fire department, hospitals, public health officials, and police department in writing of the hazards that such pesticides may present in the event of a fire. A floor plan of the storage area indicating where different pesticide classifications are regularly stored should be provided to the fire department. The fire chief should be furnished with the home telephone numbers of (i) the persons responsible for the pesticide storage facility, (ii) the appropriate Regional Administrator, who can summon the appropriate Agency emergency response team, (iii) the U.S. Coast Guard, and (iv) the Pesticide Safety Team Network of the National Agricultural Chemicals Association.

(2) *Suggestions for Fire Hazard Abatement.* (i) Where applicable, plainly label the outside of each storage area with "DANGER," "POISON," "PESTICIDE STORAGE" signs. Consult with the local fire department, regarding the use of the current hazard signal system of the National Fire Protection Association.

(ii) Post a list on the outside of the storage area of the types of chemicals stored therein. The list should be updated to reflect changes in types stored.

(3) *Suggested Fire Fighting Precautions.* (i) Wear air-supplied breathing apparatus and rubber clothing.

(ii) Avoid breathing or otherwise contacting toxic smoke and fumes.

(iii) Wash completely as soon as possible after encountering smoke and fumes.

(iv) Contain the water used in fire fighting within the storage site drainage system.

(c) Fireman should take cholinesterase tests after fighting a fire involving organophosphate or N-alkyl carbamate pesticides, if they have been heavily exposed to the smoke. Base line cholinesterase tests should be part of the regular physical examination for such firemen.

(d) Evacuate persons near such fires who may come in contact with smoke or fumes or contaminated surfaces.

(h) *Monitoring.* An environmental monitoring system should be considered in the vicinity of storage facilities. Samples from the surrounding ground and surface water, wildlife, and plant environment, as appropriate, should be tested in a regular program to assure minimal environmental insult. Analyses should be performed according to "Official Methods of the Association of Official Analytical Chemists (AOAC)," and such other methods and procedures as may be suitable.

Support D—Pesticide-Related Wastes

§ 165.11 Procedures for disposal and storage of pesticide-related wastes.

(a) In general all pesticide-related wastes should be disposed of as excess pesticides in accordance with the procedures set forth in §§ 165.7 and 165.8. Such wastes should not be disposed of by addition to an industrial effluent stream if not ordinarily a part of or contained within such industrial effluent stream, except as regulated by and in compliance with effluent standards established pursuant to sections 304 and 307 of the Federal Water Pollution Control Act as amended.

(b) Pesticide-related wastes which are to be stored should be managed in accordance with the provisions of § 165.10.

PART 166—EXEMPTION OF FEDERAL AND STATE AGENCIES FOR USE OF PESTICIDES UNDER EMERGENCY CONDITIONS

Sec.

166.1 General.

166.2 Types of exemptions.

166.3 Application for specific exemption.

APPENDIX I-B

**ANALYTICAL DATA FOR DRILLING/DECONTAMINATION WATER:
SUPPLY WELL NO. 3, N-TEAD**



ENVIRODYNE
ENGINEERS

12161 Lackland Road
St. Louis, Missouri 63146
(314) 434-6965

February 26, 1986
3060-364

RECEIVED MAR 03 1986

Ms. Linda McConnell
EA Engineering Science & Technology, Inc.
15 Loveton Circle
Sparks, MD 21152

Dear Ms. McConnell:

Enclosed are the results of analysis of two water samples from Tooele Army Depot. The samples were received January 18, 1986. Table 1 contains the results for the samples as well as the method blank and three control spikes analyzed with the lot. Table 2 contains data that will be needed to enter the results into the USATHAMA data management system. All parameters analyzed for Tooele and Lake City are listed in Table 2, so some parameters may be listed that were not required on your samples.

I have also enclosed copies of all control charts for the analyses performed as well as comments from our review of the charts. A copy of the charts and comments should be forwarded to USATHAMA for their review and approval.

Please contact me if you have any questions concerning this report or if you need additional information.

Sincerely,

Judy Stone

Judith L. Stone
Project Manager

JLS/csg
Enclosures

→ environmental protection,
hazardous materials,
wastes, *refuse*
↑

ANALYTICAL RESULTS (VOA)

Instrument: #21

Project No./Client 3062-364/EA Engineers/Tooole Date February 18, 1986 Page 1 of 2

site	////	QCMB	2	3				
lab no.	////							
frn no.	////							
analysis date	////	1-25-86	1-25-86	1-25-86				
analysis time	////							
analyst initials	////	BAK	BAK	BAK				
acrolein	100	ACROLN						
acrylonitrile	100	ACRYLO						
benzene	10	C6H6						
bromoform	20	CHBR3						
carbon tetrachloride	30	CCl4						
chlorobenzene	10	CLC6H5						
chlorodibromomethane	10	DBRCLM						
chloroethane	30	C2H5CL						
2-chloroethylvinyl ether	20	2CLEVE						
chloroform	10	CHCL3						
dichlorobromomethane	20	BRDCLM						
1,1-dichloroethane	20	11DCLE						
1,2-dichloroethane	20	12DCLE						
1,1-dichloroethylene	20	11DCE						
1,2-dichloropropane	20	12DCLP						
1,3-dichloropropylene	10	13DCP						
ethylbenzene	10	ETC6H5						
methyl bromide	30	CH3BR						
methyl chloride	10	CH3CL						
methylene chloride	10	CH2CL2	5	6	4			
1,1,2,2-tetrachloroethane	10	TCLEA						
tetrachloroethylene	10	TCLEE						
toluene	10	MEC6H5						
1,2-trans-dichloroethylene	20	T12DCE						
1,1,1-trichloroethane	20	111TCE						
1,1,2-trichloroethane	20	112TCE						
trichloroethylene	10	TRCLE						
trichlorofluoromethane	50	CCL3F						
vinyl chloride	30	C2H3CL						

VOA SURROGATES

Spike level	Units							
d4-1,2-dichloroethane	12DCD4							
d8-toluene	MEC5D8							
p-BFB	PBFB							

NOTE: All results reported in ug/l unless otherwise noted.
Where no value appears, the compound was not detected.

Project No./Client 3060-364 EA Engineers/Tooole Date February 18, 1986 Page 1 of 2

Site	////	NA	SA	QCHB				
lab no.	////	Well 3	Well 2					
frn no.	////							
analysis date	////	1-30-86	1-30-86	1-30-86				
analysis time	////							
analyst initials	////	LHC	LHC	LHC				
19 acenaphthene ANAPNE	150							
29 acenaphthylene ANAPYL	100							
39 anthracene ANTRC	100							
49 benzidine BENZID	700							
59 benzo(a)anthracene BAAATR	100							
69 benzo(a)pyrene BAPYR	600							
79 3,4-benzofluoranthene B4BFAN	200							
89 benzo(g,h)perylene BGUTPY	300							
99 benzo(h)fluoranthene BKFANT	200							
109 bis(2-chloroethoxy)methane B2CEXM	300							
119 bis(2-chloroethylether) B2CLEE	150							
129 bis(2-chloroisopropylether) B2CIPPE	150							
139 bis(2-ethylhexyl)phthalate B2EHP	150	3	3	3				
149 4-bromophenyl phenyl ether 4BRPPE	350							
159 butyl benzyl phthalate BBZP	150							
169 2-chloronaphthalene 2CNAP	200							
179 4-chlorophenyl phenyl ether 4CLPPE	150							
189 chrysene (see 5B) CHPV	100							
199 dibenz(a,h)anthracene DBAHA	150							
209 1,2-dichlorobenzene 12DCLB	200							
219 1,3-dichlorobenzene 13DCLB	200							
229 1,4-dichlorobenzene 14DCLB	200							
239 3,3'-dichlorobenzidine 33CL2B	700							
249 diethyl phthalate DEP	150							
259 dimethyl phthalate DMP	200							
269 di-n-butyl phthalate DNBP	100							
279 2,4-dinitrotoluene 24DNT	150							
289 2,6-dinitrotoluene 26DNT	800							
299 di-n-octyl phthalate DNCP	100							
309 1,2-diphenylhydrazine 12DPH	150							
(as azobenzene)								
319 fluoranthene FANT	100							
329 fluorene FIBNFR	150							
339 hexachlorobenzene CL6BZ	350							
349 hexachlorobutadiene HCBP	800							
359 hexachlorocyclopentadiene CL6CP	800							
369 hexachloroethane CL6ET	500							
379 indeno(1,2,3-cd)pyrene ICDDPY	300							
389 isophorone IECPEP	100							
399 naphthalene NAP	100							
409 nitrobenzene NB	200							
419 N-nitrosodimethylamine NDMA	150							
429 N-nitrosodi-n-propylamine NPNPA	200							
439 N-nitrosodiphenylamine NNDA	350							
449 phenanthrene (see 3B) PHANTR	100							
459 pyrene PYP	100							
469 1,2,4-trichlorobenzene 124TCB	300							

BNA SURROGATES

Spike level	Units							
ds-nitrobenzene NBD5								
2 fluorobiphenyl FIOBP								
ds-naphthalene NAFDB								

NOTE: All results reported in ug/l unless otherwise noted.
Where no value appears, the compound was not detected.

NA=North Area

SA=South Area

ANALYTICAL RESULTS

Instrument: 022

Project No./Client 3060-364 EA Engineers/Tooole Date February 18, 1986 Page 2 of 2

Site	////	NA	SA	OCMB					
lab no.	////	Well 3	Well 2						
frn no.	////								
analysis date	////	1/30/86	1/30/86	1/30/86					
analysis time	////								
analyst initials	////	LHC	LHC	LHC					
ACID COMPOUNDS									
2A 2-chlorophenol	2CLP	200							
2A 2,4-dichlorophenol	24DCLP	300							
3A 2,4-dimethylphenol	24DMFN	400							
4A 4,6-dinitro-o-cresol	46DN2C	700							
5A 2,4-dinitrophenol	24DNP	700							
6A 2-nitrophenol	2NP	400							
7A 4-nitrophenol	4NP	350							
8A p-chloro-o-cresol	4CL3C	400							
9A pentachlorophenol	PCP	350							
10A phenol	PHENOL	150							
11A 2,4,6-trichlorophenol	246TCP	800							
ACID SURROGATES									
Spike level		Units							
2-F-phenol	2FP								
phenol-d6	PHENOD6								
penta-F-phenol	FPF								
PESTICIDES									
1P aldrin	ALDRIN	1000							
2P a-BHC	ABHC	1000							
3P b-BHC	BBHC	1000							
4P g-BHC (lindane)	LIN	1000							
5P d-BHC	DBHC	1000							
6P chlordane	CHLORAN	25,000							
7P 4,4'-DDT	PPDDT	1000							
8P 4,4'-DDE	PPDDE	1000							
9P 4,4'-DDD	PPDDD	1000							
10P dieldrin	DLDRLN	1000							
11P a-endosulfan	AFENCIF	5000							
12P b-endosulfan	BFENCIF	5000							
13P endosulfan sulfate	ESFSSO4	5000							
14P endrin	ENDRN	2000							
15P endrin aldehyde	ENDALD	5000							
16P heptachlor	HPC	1000							
17P heptachlor epoxide	HPCIE	1000							
18P PCB-1242	PCB242	10,000							
19P PCB-1254	PCB254	10,000							
20P PCB-1221	PCB221	10,000							
21P PCB-1232	PCB232	10,000							
22P PCB-1246	PCB246	10,000							
23P PCB-1260	PCB260	10,000							
24P PCB-1016	PCB016	10,000							
25P toxaphene	TOXPHEN	50,000							

NOTE: All results reported in _____ unless otherwise noted.
Where no value appears, the compound was not detected.

TABLE 1. DATA SUMMARY^a, TOOELE ARMY DEPOT
(Cont Inued)

Analyte	North Area		South Area		QCMB		QCSP		Target/Found		QCSP	
	Well 3		Well 2									
Surfactants	<25		<25		<25		200/195		500/400		1,000/960	
Phenols (PHEN/C)	5		5		<5		10/9		30/30		50/50	
NIT (NO3/NO2)	2,750		1,850		<500		1,000/1,000		3,000/3,000		5,000/4,800	
CL	158		52,600		<900		2,000/1,700		5,000/5,200		10,000/9,800	
F	310		200		<100		200/200		400/420		1,000/1,050	
BR	410		490		<100		200/240		500/400		1,000/1,010	
Pesticides:												
aldrin	<0.15		<0.15		<0.15		0.4/0.125		0.8/0.481		2.0/1.49	
alpha-BHC	<0.1		<0.1		<0.1							
beta-BHC	<0.1		<0.1		<0.1							
delta-BHC	<0.1		<0.1		<0.1							
lindane	<0.03		<0.03		<0.03		0.04/0.042		0.08/0.106		0.2/0.258	
chlordane	<0.1		<0.1		<0.1							
4,4'-DDD	<0.1		<0.1		<0.1							
4,4'-DDE	<0.1		<0.1		<0.1							
4,4'-DIT	<0.3		<0.3		<0.3		0.5/0.460		1.0/1.10		2.5/2.89	
dieldrin	<0.086		<0.086		<0.086		0.2/0.183		0.4/0.385		1.0/1.01	
endosulfan I	<0.1		<0.1		<0.1							
endosulfan II	<0.1		<0.1		<0.1							
endosulfan sulfate	<0.1		<0.1		<0.1							
endrin	<0.22		<0.22		<0.22		0.4/0.408		0.8/0.919		2.0/2.53	
endrin aldehyde	<0.1		<0.1		<0.1							
heptachlor	<0.7		<0.7		<0.7		2.0/1.14		4.0/3.38		10/8.36	
heptachlor epoxide	<0.1		<0.1		<0.1							
toxaphene	<0.5		<0.5		<0.5							
PCB-1016	<0.5		<0.5		<0.5							
PCB-1221	<0.5		<0.5		<0.5							
PCB-1232	<0.5		<0.5		<0.5							
PCB-1242	<0.5		<0.5		<0.5							
PCB-1248	<0.5		<0.5		<0.5							
PCB-1254	<0.5		<0.5		<0.5							
PCB-1260	<0.5		<0.5		<0.5							

NOTES: ^aAll data are reported in ug/l and are not corrected for accuracy.

TABLE 2. DATA FOR CODING

Analyte	Method No.	Accuracy	Precision ^a	Inst. No.	Initials	Analysis Date (1986)
Nitroaromatics:						
NB	D1	0.746	0.375	10	MHO	1/20
13DNB	D1	0.960	1.02	10	MHO	1/20
135TNB	D1	0.867	0.378	10	MHO	1/20
24DNT	D1	0.955	0.797	10	MHO	1/20
26DNT	D1	0.835	0.323	10	MHO	1/20
246TNT	D1	0.695	0.482	10	MHO	1/20
RDX	D1	0.851	4.70	10	MHO	1/20
HMX	D1	0.414	5.03	10	MHO	1/20
Tetryl	D1	0.778	3.97	10	MHO	1/20
BNAs:						
2FP	K1	0.370	999.	22	LMC	1/30
PHEND6	K1	0.263	999.	22	LMC	1/30
PFPP	K1	0.237	999.	22	LMC	1/30
2FBP	K1	0.379	999.	22	LMC	1/30
DEPD4	K1	0.749	999.	22	LMC	1/30
DNOPD4	K1	0.391	999.	22	LMC	1/30
VOAs:						
CDCL3	2J	0.937	999.	21	BAK	1/25
12DCD4	2J	0.820	999.	21	BAK	1/25
ETBD10	2J	0.960	999.	21	BAK	1/25
Metals:						
Sb	1B ^b	1.00	3.72	11	AMS	2/21
As	1B	1.04	999.	11	AMS	2/26
Ba	1M	0.901	999.	12	RDS	2/17
Be	b	0.987	3.09	20	JMN	2/17
Cd	1M	0.934	1.13	12	RDS	2/13
Cr	1B	1.01	2.69	11	AMS	2/14
Cu	1B	1.01	999.	11	AMS	2/22
Pb	1B	0.832	4.43	11	AMS	2/21
Ni	b	0.880	8.28	20	JMN	2/17
Se	1B	1.05	999.	11	AMS	2/23
Ag	1B	1.07	999.	11	AMS	2/12
Tl	1B	0.881	2.34	11	AMS	2/22
Zn	1M	1.04	26.6	12	RDS	2/13
Hg	1D	0.964	0.244	13	PAW	1/23
CYN	4K	1.02	5.38	15	BJW	1/27
Surfactants	99	000	999.	15	CAJ	1/18
Phenols (PHENLC)	b	1.02	0.961	16	EGD	1/29
NIT (NO3/NO2)	1U	0.950	47.3	16	EGD	1/27
CL	6X	1.00	999.	00	RDS	2/10
F	b	1.06	120	15	PAW	2/12
BR	c	0.989	999.	15	CAJ	2/11

TABLE 2. DATA FOR CODING
(CONTINUED)

<u>Analyte</u>	<u>Method No.</u>	<u>Accuracy</u>	<u>Precision^a</u>	<u>Inst. No.</u>	<u>Initials</u>	<u>Analysis Date (1986)</u>
Pesticides:						
ALDRN	2F	0.673	0.0494	07	SAW	1/30
LIN	2F	1.22	999.	07	SAW	1/30
CLDAN	2F	0.947	999.	07	SAW	1/30
PPDDT	2F	1.21	999.	07	SAW	1/30
DLDRN	2F	1.04	0.0290	07	SAW	1/30
ENDRN	2F	1.33	0.0825	07	SAW	1/30
HPCL	2F	0.886	999.	07	SAW	1/30

NOTES: ^aThe precision value (other than 999.) must be tied to the exponent for the result. If the exponent is other than zero, the decimal point for the precision value must be moved so when the reported precision is combined with the exponent, it gives the value listed in the table.

^bThese parameters have not been certified by USATHAMA as of this report date, but the certification analyses and method documentation have been submitted for approval.

^cBromide is not certified.

GC/MS PRIORITY POLLUTANTS-DETECTION LIMITS

VDA's (WATER)

parameter	code	detection limit (ugl)
BENZENE	C6H6	3
BROMOFORM	CHBR3	3
CARBON TETRACHLORIDE	CCL4	0.8
CHLOROBENZENE	CLC6H5	3
CHLORODIBROMOMETHANE	DBRCLM	0.8
CHLOROETHANE	C2H5CL	3
2-CHLOROETHYL VINYL ETHER	2CLEVE	3
CHLOROFORM	CHCL3	3
DICHLOROBROMOMETHANE	BRDCLM	0.8
1,1-DICHLOROETHANE	11DCLE	3
1,2-DICHLOROETHANE	12DCLE	0.8
1,1-DICHLOROETHYLENE	11DCE	3
1,2-DICHLOROPROPANE	12DCLP	0.8
1,3-DICHLOROPROPYLENE	13DCPE	0.8
ETHYLBENZENE	ETC6H5	3
METHYL BROMIDE	CH3BR	3
METHYL CHLORIDE	CH3CL	3
METHYLENE CHLORIDE	CH2CL2	3
1,1,2,2-TETRACHLOROETHANE	TCLEA	3
TETRACHLOROETHYLENE	TCLEE	3
1,2-TRANS-DICHLOROETHYLENE	T12DCE	3
1,1,1-TRICHLOROETHANE	111TCE	0.8
1,1,2-TRICHLOROETHANE	112TCE	0.8
TRICHLOROETHYLENE	TRCLE	3
TRICHLOROFLUOROMETHANE	CCL3F	3
VINYL CHLORIDE	C2H3CL	3

GC/MS PRIORITY POLLUTANTS-DETECTION LIMITS

ACID'S (WATER)

parameter	code	detection limit (ugl)
2-CHLOROPHENOL	2CLP	4
2,4-DICHLOROPHENOL	24DCLP	4
2,4-DIMETHYLPHENOL	24DMPN	3
4,6-DINITRO-O-CRESOL	46DN2C	9
2,4-DINITROPHENOL	24DNP	9
2-NITROPHENOL	2NP	3
4-NITROPHENOL	4NP	9
P-CHLORO-M-CRESOL	4CL3C	9
PENTACHLOROPHENOL	PCP	9
PHENOL	PHENOL	3
2,4,6-TRICHLOROPHENOL	246TCP	9

PESTICIDE'S (WATER)

parameter	code	detection limit (ugl)
ALDRIN	ALDRN	4
ALPHA-BHC	ABHC	4
BETA-BHC	BBHC	4
GAMMA-BHC (LINDANE)	LIN	4
DELTA-BHC	DBHC	4
CHLORDANE	CLDAN	3
4,4'-DDT	PPDDT	3
4,4'-DDE	PPDDE	3
4,4'-DDD	PPDDD	3
DIELDRIN	DLDRN	3
ALPHA-ENDOSULFAN	AENSLF	3
BETA-ENDOSULFAN	BENSLF	3
ENDOSULFAN SULFATE	ESFSO4	3
ENDRIN	ENDRN	4
HEPTACHLOR	HPCL	4
HEPTACHLOR EPOXIDE	HPCLE	4

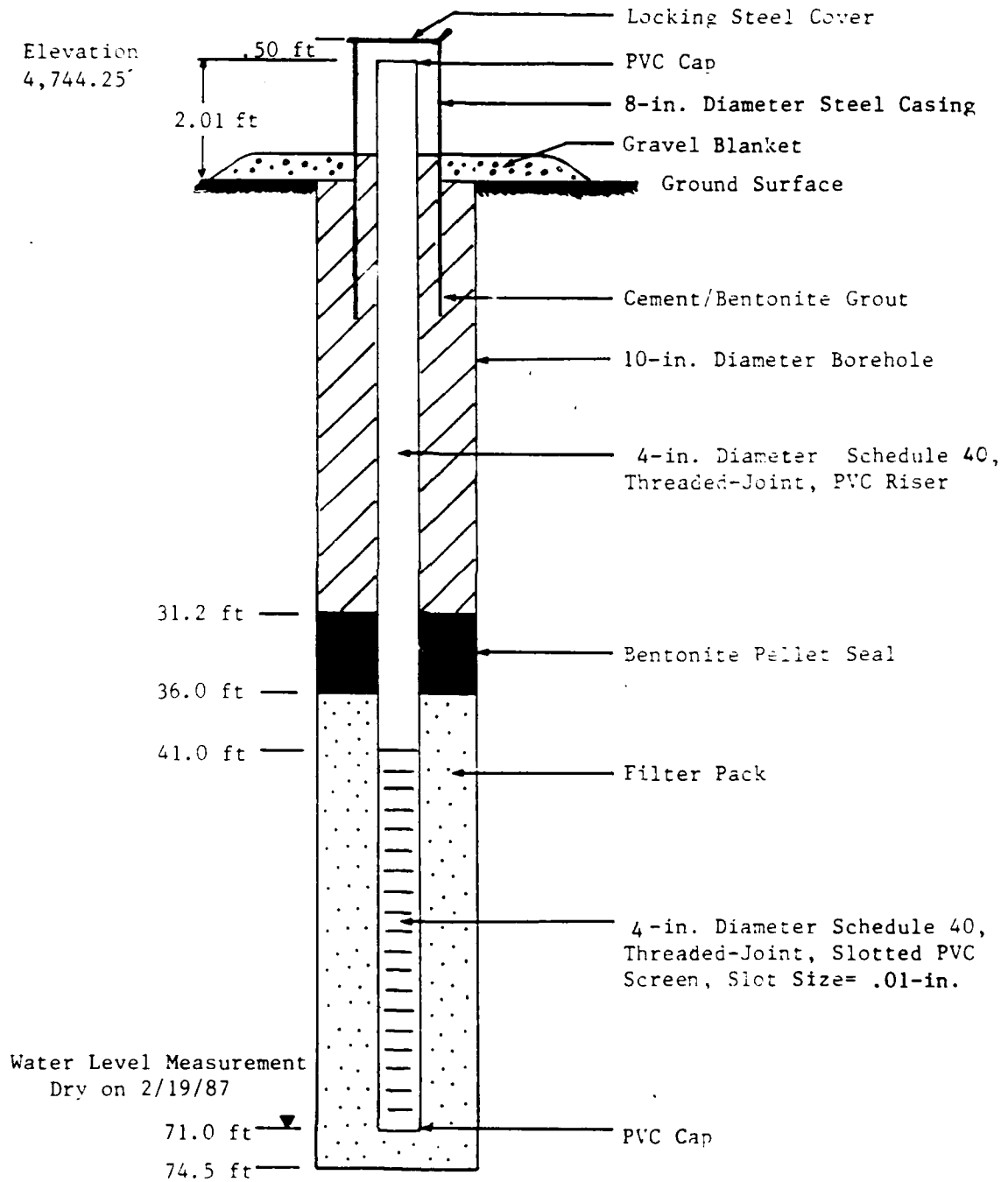
GC/MS PRIORITY POLLUTANTS-DETECTION LIMITS
BNA's (WATER)

parameter	code	detection limit (ugl)
ACENAPHTHENE	ANAPNE	10
ACENAPHTHYLENE	ANAPYL	10
ANTHRACENE	ANTRC	4
BENZIDINE	BENZID	3
BENZO(A)ANTHRACENE	BAANTR	3
BENZO(A)PYRENE	BAPYR	3
3,4-BENZOFLUORANTHENE	BBFANT	3
BENZO(GH)PERYLENE	BGHIPY	3
BENZO(K)FLUORANTHENE	BKFANT	3
BIS-2-CHLOROISOPROPYLETHYR	B2CIPE	10
BIS-3-ETHYLHEXYLPHTHALATE	B2EHP	3
4-BROMOPHENYLPHENYLETHYR	4BRPPE	10
BUTYLBENZYLPHTHALATE	BBZP	3
2-CHLORONAPHTHALENE	2CNAP	10
4-CHLOROPHENYLPHENYLETHYR	4CLPPE	10
CHRYSENE	CHRY	3
DIBENZO(A,H)ANTHRACENE	DBAHA	3
1,2-DICHLOROBENZENE	12DCLB	10
1,3-DICHLOROBENZENE	13DCLB	10
1,4-DICHLOROBENZENE	14DCLB	10
3,3'-DICHLOROBENZIDINE	33DCBD	3
DIETHYLPHTHALATE	DEP	4
DIMETHYLPHTHALATE	DMP	4
DI-N-BUTYLPHTHALATE	DNBP	4
2,4-DINITROTOLUENE	24DNT	10
2,6-DINITROTOLUENE	26DNT	10
DI-N-OCTYLPHTHALATE	DNOP	3
1,2-DIPHENYLHYDRAZINE	12DPH	10
FLUORANTHENE	FANT	3
FLUORENE	FLRENE	10
HEXACHLOROBENZENE	CL6BZ	10
HEXACHLOROBUTADIENE	HCBD	10
HEXACHLOROCYCLOPENTADIENE	CL6CP	10
HEXACHLOROETHANE	CL6ET	10
INDENO(1,2,3-CD)PYRENE	ICDPYR	3
ISOPHORONE	ISOPHR	10
NAPHTHALENE	NAP	10
NITROBENZENE	NB	10
N-NITROSODIMETHYLAMINE	NNDMEA	10
N-NITROSODI-N-PROPYLAMINE	NDNPA	3
N-NITROSODIPHENYLAMINE	NNDPA	10
PHENANTHRENE	PHANTR	3
PYRENE	PYR	3
1,2,4-TRICHLOROBENZENE	124TCB	10

APPENDIX I-C

**N-TEAD WELL/LYSIMETER COMPLETION DIAGRAMS,
BORING LOGS, AND DEVELOPMENT LOGS**

COMPLETION DIAGRAM WELL N-3C



TOOELE ARMY DEPOT, UTAH

LEGEND

N-3c

Particle Size Identification

Boulders	12-in. diameter or more
Cobbles	3-12-in. diameter
Gravel	Coarse 3/4-3 in. Fine 1/4-3/4 in.
Sand	Coarse 2.0-4.75 mm (dia. of pencil lead) Medium 0.425-2.0 mm (dia. of broom straw) Fine 0.074-0.425 mm (dia. of human hair)
Silt	0.005-0.074 mm (cannot see particles)

Moisture Content

Descriptive Term	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Relative Proportions

Descriptive Term	Percent
Trace	1-10
Little	11-20
Some	21-35
And	36-50

NONCOHESIVE SOILS

(Silt, Sand, Gravel, and Combinations)

Density

Descriptive Term	N(a)
Very Loose	5 blows/ft or less
Loose	6-10 blows/ft
Medium Dense	11-30 blows/ft
Dense	31-50 blows/ft
Very Dense	51 blows/ft or more

COHESIVE SOILS

(Clay, Silt, and Combinations)

Consistency

Descriptive Term	N(a)
Very Soft	3 blows/ft or less
Soft	4-5 blows/ft
Medium Stiff	6-10 blows/ft
Stiff	11-15 blows/ft
Very Stiff	16-30 blows/ft
Hard	31 blows/ft or more

DRILLING CONTR *Sergeant, Hauskins Beckw. Co.*
Driller: Jim Carter



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Gradiation
TRACE 1-2%
Little 11-20%
Some 21-35%
AND 36-50%

JOB NO

THA 51E

CLIENT

USATNAMA

LOCATION

TEAD-North

DRILLING METHOD: Truck mounted CMC-

750 drill rig using 10" x 100 6-in

I.D. hollow stem Auger

SAMPLING METHOD: 2-in diameter Standard

Sp. H Spdm Sampler (S.S.) driven

24" w/ 140 lb Hammer 3" Throw

WATER LEVEL

TIME

DATE

REFERENCE

BORING NO

N-3C

SHEET

1 of 4

DRILLING

START TIME

1635 0800

DATE

7-2-86 7-3-86

SAMPLER TYPE	INCHES DRIVER RECORDED	DEPTH OF CASING	SAMPLE NO	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG
GRAB			1	6-1'	0	
					1	
					2	
					3	
					4	
S.S.	24" 14"		2	8	5	
			4-6	8	6	
				9	7	SP
					8	
					9	
S.S.	24" 14"		3	9	10	
			4-11	10	11	
				9	12	
					13	
S.S.	24" 16"		4	7	14	SM
			4-16	6	15	
				8	16	
					17	
					18	
					19	SM
S.S.	24" 20"		5	7	20	ML
			4-21	6	21	

SURFACE CONDITIONS

REMARKS

Collected first sample from materials coming up Augers within 1' of foot, note:

Advance Augers to 4' bgs (below ground surface)

Sand yellowish gray (S.Y.G.): fine to medium sand w/ a trace of silt loose dry
Drove Split Spdm (S.S.) 24" w/ No. 16 Hammer from 4-6' w/ 14" Recovery (R).

note: Advanced Augers to 9' bgs. Drilling very quickly S.S. driven from 9-11'

Sand yellowish gray (S.Y.G.): fine sand w/ little medium sand trace silt occasional area of rust stains loose dry

note: Advance Augers to 14' bgs. No noticeable drilling change

S.S. driven from 14' to 16' w/ fine to v. fine sand and silt trace medium sand loose dry

note: Augers Advance to 19' bgs. S.S. driven from 19' - 21' w/ 22" R.

samey silt yellowish gray (S.Y.G.) silt and fine sand w/ little medium to coarse sand loose dry.

BY *Tom Porter*
DATE *5/12/87* CHK'D BY *Ray*



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TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO

THASIE

CLIENT

USATHAMA

LOCATION

TEAD-ADTH

DRILLING METHOD

BORING NO

N-3C

SHEET

2 of 4

SAMPLING METHOD

DRILLING

WATER LEVEL

START TIME

TIME

FINISH TIME

DATE

DATE

REFERENCE

DATE

SAMPLER TYPE	INCHES DRIVEN RECORDED	DEPTH OF CASING	SAMPLE NO	BLOWS/6 IN. SAMPLER
--------------	---------------------------	-----------------	-----------	------------------------

DEPTH
IN FEET

GRAPHIC LOG

SURFACE CONDITIONS

Remarks

Note: Augers advanced to 24' S.S. driven from 24'-26' w/ 20" R.

S.S. 24" 24"	6	8
		6
		7

25

Sandy silt AS ABOVE (SY 7/2) occasional thin beds of fine to medium sand some rust colored staining. ~~dry~~ medium silt dry

Note: Advanced augers to 29' S.S. driven from 29'-31' w/ 24"

S.S. 24" 24"	7	8
		10
		9

30

Silt yellowish gray to light R. olive gray (SY 7/2): Silt w/ some fine and fine sand little medium sand trace pea gravel, layers of rust colored staining low to stiff dry

Note: Advanced augers to 34' S.S. driven from 34'-36' w/ 18" R. Harder

S.S. 24" 18"	8	10
		16
		24
		15

35

Sand yellowish gray (SY 7/2) fine to very fine sand w/ little to trace silt dense dry to moist

Note: Advance augers to 39' S.S.

S.S. 24" 18"	9	3
		5
		9

40

Top 5" Clay light olive gray (SY 7/2) w/ little S.H. Next 13" Silt w/ little fine to medium sand trace little clay moist soft



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TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO

THASIE

CLIENT

USATHAMA

LOCATION

TEAO-NORTH

DRILLING METHOD

BORING NO

N-3C

SHEET

3 of 4

SAMPLING METHOD

DRILLING

WATER LEVEL

START

FINISH

TIME

TIME

TIME

DATE

DATE

DATE

REFERENCE

SAMPLER TYPE
INCHES
RECORDED
DEPTH OF
CASING
SAMPLE NO
SAMPLE DEPTH
BLOWS/6 IN.
SAMPLER
DEPTH
IN FEET
GRAPHIC LOG

SURFACE CONDITIONS

REMARKS

Note: Augers advanced to
44' bgs.
S.S. driven from
44-46' w/ 16" R.

Top 8" sandy silt yellowish
gray (54%) silt w/ some
fine to medium sand trace. Note: Augers
clay moist soft rust colored advanced to
staining 49' balls of
Bottom 8" silty clay light olive silt/clay com
gray: clay and silt w/ up augers
little fine sand occasional S.S. driven from
rust colored staining moist. 49-51' w/ 18"
soft R.

LAYERED sandy silt light olive
gray, silty sand yellowish
gray and clay grayish olive.
clay layers 1/2" - 1" thick.
laminar stiff

Note: Augers advanced
to 54' material coming
up augers mudwed
S.S. driven from

Top 6" silt light olive 54-56' w/ 20"
gray (54%) silt w/ R.
little to some fine sand trace
clay no apparent bedding wet
2" silty clay layer bedded
2" silty sand layer yellowish
gray - light olive gray: fine sand
w/ some to med silt moist

some rust stain medium dense Note: Augers
advanced to 59' bgs
S.H. pale olive (104%) S.S. driven from
silt w/ little fine sand 59-61' w/ 19"
little to trace clay R.
soft wet some rust
colored staining

DRILLING CONTR
J.H. 7.8
Jim Carter

BY Tom Carter
DATE 5/1/02 CHECKED BY JHC



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.	CLIENT	LOCATION	
THASIE	USATHAMA	TEAD-ABIA	
DRILLING METHOD:		BORING NO.	
		N-3C	
SAMPLING METHOD:		SHEET	
		4 of 4	
		DRILLING	
		START	FINISH
WATER LEVEL		TIME	TIME
TIME			
DATE		DATE	DATE
REFERENCE			

SAMPLER TYPE	INCHES DRIVEN	DEPTH OF CASING	SAMPLE NO.	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
					0		
					1		
					2		
					3	ML	
				6	4		
SS	24" / 20"		14	6	45		Note: @ 59' bgs. pulled Augers back 4' ended boring for the day @ 1545 hrs. 7-2-86
				7			
				8			
					6		
					7		
					8		
					9	CL	
SS	24" / 21"		15		10		Note: 7-3-86 @ 0715hrs After sitting overnight hole open to 59' bgs. no water in hole. Advanced Augers to 64' bgs. S.S. driven from 64-66' w/20" R.
					1	ML	
					2	SM	
					3		
					4	SP	
SS	24" / 20"		16		75		Let hole sit 15 min. No water coming in hole. Note: Advance Augers 69' bgs. S.S. driven 69-71' w/21" R.
					6	CL	
					7	SP	
					8		
					9		
					0		

DRILLING CONTR 5,430

Dr. Mr. Jim Carter

BY Tom Parker

DATE 5/7/87

CHECKED BY

ended boring @ 0700hrs w/ hole open to 74.5' bgs. left to talk to LAP about well installation

Well Development

Well #: N-3C

Date Well Installed: 7-3-86

Weather: Sunny 85-90°

Development Time: 1600 hrs - 1700 hrs. (7-3-86)

Static Water Level: 7-3-86
Dry @ 1600 hrs. 1700 hrs. 69.6'

7-4-86 dry.

Well And Borehole Vol.

Dry

pH And Spec. Conductivity:

Did not take pH of S.C. readings because water was induced to well to stimulate recharge.

Well Depth And Screen Length: Well screen set @ 73.00' from top of stickup = 2.00' w/ 30' of 4" PVC screen.

Development Description:

Added 40 gal. of water to try and induce recharge into well by surging within screen interval.

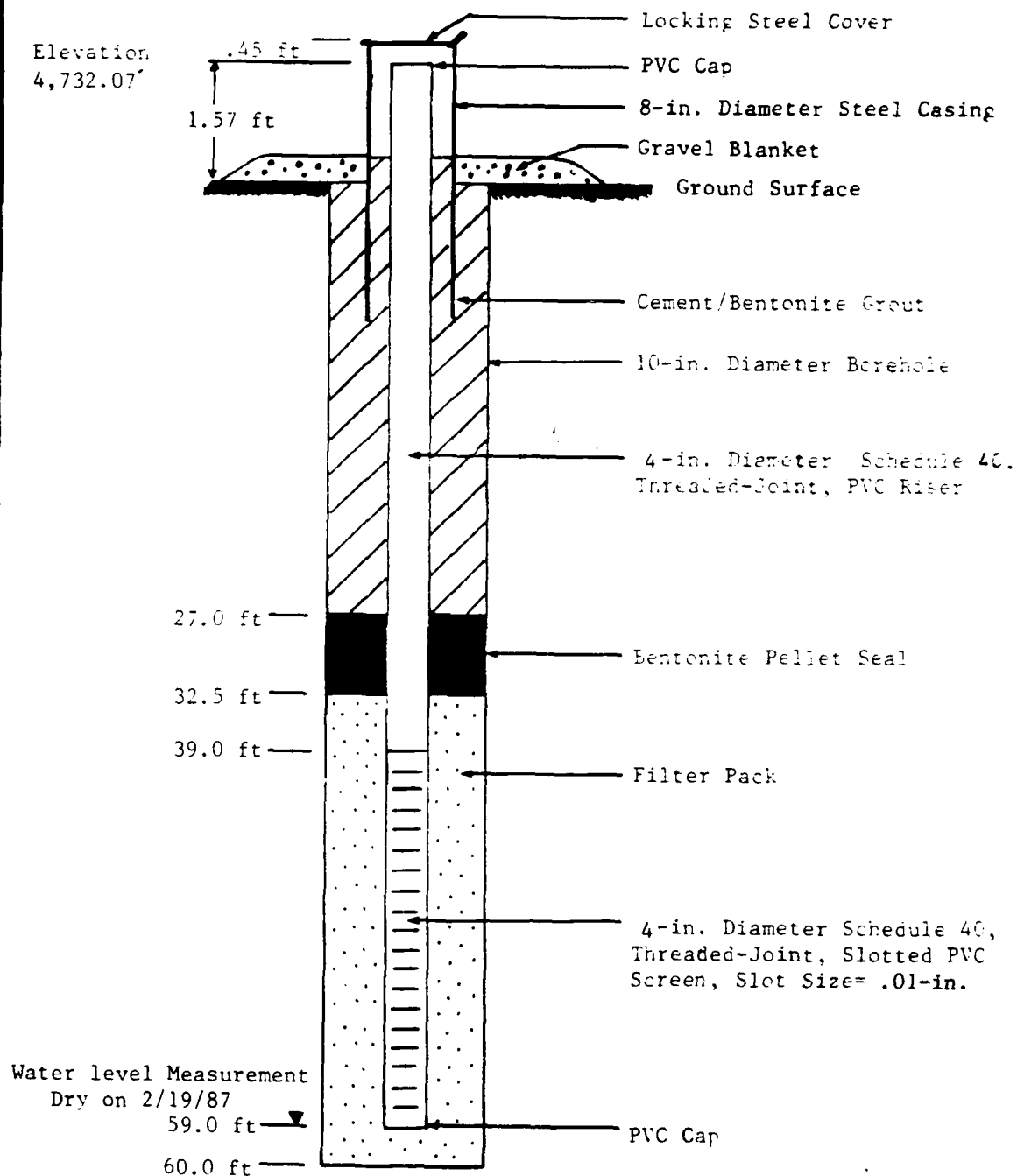
Removed 20 gal. water started out silty appeared to clear up. left well with approx. 2' of water in well to see if well would recharge on 7-4-86 well was dry.

Quantity of Water Removed:

7-3-86 bailed 20 gal.

COMPLETION DIAGRAM

WELL N-3D1



TOOELE ARMY DEPOT, UTAH

LEGEND

N-301

Particle Size Identification

Boulders	12-in. diameter or more
Cobbles	3-12-in. diameter
Gravel	Coarse 3/4-3 in.
	Fine 1/4-3/4 in.
Sand	Coarse 2.0-4.75 mm (dia. of pencil lead)
	Medium 0.425-2.0 mm (dia. of broom straw)
	Fine 0.074-0.425 mm (dia. of human hair)
Silt	0.005-0.074 mm (cannot see particles)

Moisture Content

Descriptive Term	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Relative Proportions

Descriptive Term	Percent
Trace	1-10
Little	11-20
Some	21-35
And	36-50

NONCOHESIVE SOILS

(Silt, Sand, Gravel, and Combinations)

Density

Descriptive Term	N (s)
Very Loose	5 blows/ft or less
Loose	6-10 blows/ft
Medium Dense	11-30 blows/ft
Dense	31-50 blows/ft
Very Dense	51 blows/ft or more

COHESIVE SOILS

(Clay, Silt, and Combinations)

Consistency

Descriptive Term	N (s)
Very Soft	3 blows/ft or less
Soft	4-5 blows/ft
Medium Stiff	6-10 blows/ft
Stiff	11-15 blows/ft
Very Stiff	16-30 blows/ft
Hard	31 blows/ft or more



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.	CLIENT	LOCATION	
THASIE	USA7HAMA	TEAO NORTH	
DRILLING METHOD: Truck mounted CMC		BORING NO.	
730 Drill rig using 10-in OD.		N-301	
and 6-in. 30" Hollow Stem Auger		SHEET	
SAMPLING METHOD: 3" Standard Spl. 1		1 of 4	
Split driven 24" w/ 140 lb		DRILLING	
hammer 30" throw		START	FINISH
WATER LEVEL		TIME	TIME
TIME		1025	1140
DATE		DATE	DATE
REFERENCE		7-7-86	7-8-86

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
GIB			1		0		Remarks
					1		Sand pale yellow brown (10yr 6/2): fine-medium
					2		Sand trace silt dry loose
					3		
					4	SP	note: Augers advanced to 4' below ground
SS 24" 18"			2	5	5		fine sand w/ little surface (bgs)
			4	7	6		medium sand and trace silt. dry loose
				7	7		no apparent bedding 18" Recovery (R)
					8		note: Augers advanced to 9' bgs
					9		yellow grey (5yr 6/2) SS driven from
SS 24" 2"			3	6	10	SM	Sand as above: 9-11' w/ 20" R.
			4	5	11		with little silt dry
				6	12		note: Augers advanced to 14' bgs. Drilling very quickly to
					13		apparent changes in drilling
SS 24" 20"			4	4	14	ML	silt pale olive (10yr 6/2): SS driven
			5	4	15		silt w/ some fine sand faintly bedded
				5	16		dry loose little rust color staining trace medium
					17		A coarse sand.
					18		note: Augers advanced to 19' bgs
					19		SS driven from
SS 24" 24"			5	6	20		19-21' w/ 24" R.
				7			silt as above w/ some to little fine sand dry soft

HAUSKENS
DRILLING CONTINUED
1-11-86 J. M. (A. H.)

BY Tom Porter
DATE 8/1/87 CHECKED BY [Signature]



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THA 1E

CLIENT

USATAMA

LOCATION

TEAC - N

DRILLING METHOD:

BORING NO.

N-30

SAMPLING METHOD:

SHEET

2 of 4

DRILLING

START

FINISH

WATER LEVEL

TIME

DATE

REFERENCE

DATE

DATE

SURFACE CONDITIONS:

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS IN SAMPLER	DEPTH IN FEET	GRAPHIC LOG
				6	20	
					1	ML
					2	
					3	
				7	4	ML
S.S.	24"		6	5	25	SM
	24"		7	6		
				10	6	
					7	
					8	
					9	
S.S.	24"		7	12	30	SP
	24"			20		SM
				23	1	
					2	
					3	CL
					4	
S.S.	24"		8	7	35	ML
	24"			6		
				7		
				9	6	
					7	
					8	
					9	
S.S.	24"		9	6	40	
	24"			10		
				15		

Remarks

note: Augers Advance to 24' bgs. S.S. driven from 24-26' w/ 24" R.

Sandy silt Pale Olive: (10yr 1/2) silt w/ some to and fine sand trace to little clay trace pea gravel finely bedded w/ occas. moist rust colored staining. dry loose

Note: Augers Advanced to 29' bgs. Drilling very quick S.S. driven from 29-31' w/ 24" R.

Strat yellowish gray (5y 1/2) fine to very fine sand w/ trace to little silt

stiff dry medium dense Note: Advanced Augers to 34' bgs. S.S. driven from 34-36' w/ 24" R.

Top 5' silty clay light olive gray silty w/ some to little silt moist soft bottom 17" silt light olive gray (5y 1/2): silt w/ little fine sand trace gravel laminated w/ rust colored staining moist medium started drilling still Note: Advanced Augers to 39' S.S. driven from 39-41' w/ 24" R.

Silt as above w/ thin beds of clay and silty sand. moist, rust colored

DRILLING CONTINUED 5, 4, 3, 2, 1, 0

DATE 5/10/02 CINDY BRADY

BY Tom Porter



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.	CLIENT	LOCATION
THASIE	USATHAMA	TEAD - N
DRILLING METHOD:		BORING NO.
		N-301
		SHEET
		3 of 4
SAMPLING METHOD:		DRILLING
		START TIME
		FINISH TIME
WATER LEVEL		DATE
TIME		DATE
DATE		
REFERENCE		

DRILLING CONTINUED
SHEETS
THASIE

BY: Tom Parker
DATE: 5/12/80
CHK'D BY: JGP

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	REMARKS
				14	10		Stationing: 31.11
					1	ML	Note: Auger's Advanced to 44'. Pulls of silt coming up side of Auger's. 60" 40-44" S.S. driven from 44-46 w/ 24" R.
					2		
					3		
					4		Top 8" Sandy silt pale olive: (104R 1/2)
				14			Silt w/ some fine to medium sand:
				11	45	SM	moist to wet.
SS 24" 24"			10	11			17. 1/2 12" Sand yellowish gray (54 1/2)
				15	6		Fine sand w/ little to some silt
					7	ML	moist - dry medium dense
					8		Bottom 4" silt laminated:
					9		silt w/ little to some sand
					10		trace clay dry-moist silt
					11		Note: Advanced auger to 49' S.S. driven from 49-51' w/ 20" R.
				8	50	ML	Top 8" silt as above
SS 24" 24"			11	8			moist to wet.
				15	1	ML	12" sandy silt light
				11	2	SM	olive gray (51 1/2) w/ some
					3		to and fine sand occasional
					4		thin layers of clean sand. moist-
					5		wet rust colored staining.
					6		medium silt
					7		Note: Advanced auger to 54' 1/2 S.S. driven from 54-56 w/ 22" R.
				7	55	ML	Silt yellowish gray to light
SS 24" 24"			12	9			olive gray: silt w/ little
				10			fine sand trace clay
				11			laminated moist last
					6		4" wet medium stiff
					7		let hole sit 15 m
					8		with auger at 54'
					9		no water in hole
					10		Note: Advanced auger to 59' S.S. driven from 59-61' w/ 20" R.
				5			Silt light olive gray (54 1/2)
SS 24" 24"			13	5			Silt w/ little to some clay
				6	60		trace to little fine sand
							rust colored areas wet. soft



EA ENGINEERING,
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LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASIE

CLIENT

USATAMA

LOCATION

TEAC-N

DRILLING METHOD:

BORING NO.

N-301

SHEET

4 of 4

SAMPLING METHOD:

DRILLING

START

FINISH

TIME

TIME

WATER LEVEL

TIME

DATE

REFERENCE

DATE

DATE

DRILLING CONTIN

SHB
JRM Carter

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
				7	60		Ended bore hole @
					1		59' 1140 hrs.
					2		7-8-86
					3		7-25-86 1300 hrs.
					4		Moved to location
					5		25' East of Borehole
					6		Top 8" (S, G)
					7		N-30 to drill
					8		Sandy silt light olive gray: hole for lysimeter
					9		S. H. w/ little to some
					10		fine sand trace clay Advance augers to
					11		thick bedded moist silt 64' 65 (G-nod)
					12		Entered 8" S.S. driven from
					13		Sand: fine to medium 64-66' w/ 16"
					14		Sand w/ little silt L.
					15		moist - dry
					16		Pulled auger @
					17		hole open to
					18		@ 61.5' 655.
					19		
					20		
					21		
					22		
					23		
					24		
					25		
					26		
					27		
					28		
					29		
					30		
					31		
					32		
					33		
					34		
					35		
					36		
					37		
					38		
					39		
					40		

BY JRM Carter DATE 8/1/87 CHK'D BY SPD

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: TEAD - N. AREA TNT Washout

Well No: N-301 Gauge Date: 7-3-86 Time: 0900 hrs.

Weather: _____

Well Condition: _____

Well Diameter (inches): 4 in PVC WELL in 10 in Borehole

Odor (describe): _____

Sounding Method: GED ^{W.L.} Indicator Measurement Reference: Top PVC

Stick up/down (ft): 1.57

(1) Well Depth (ft): 55.0' Purge Date: _____ Time: _____

(2) Depth to Liquid (ft): _____ Purge Method: _____

(3) Depth to Water (ft): WELL DRY Purge Rate (gpm): _____

(4) Liquid Depth [(1)-(2)]: _____ Purge Time (min): _____

(5) Liquid Volume [(4)x(F)] (gal): _____ Purge Volume (gal): _____

Did Well Pump Dry? Describe: WELL DRY, therefore
no development.

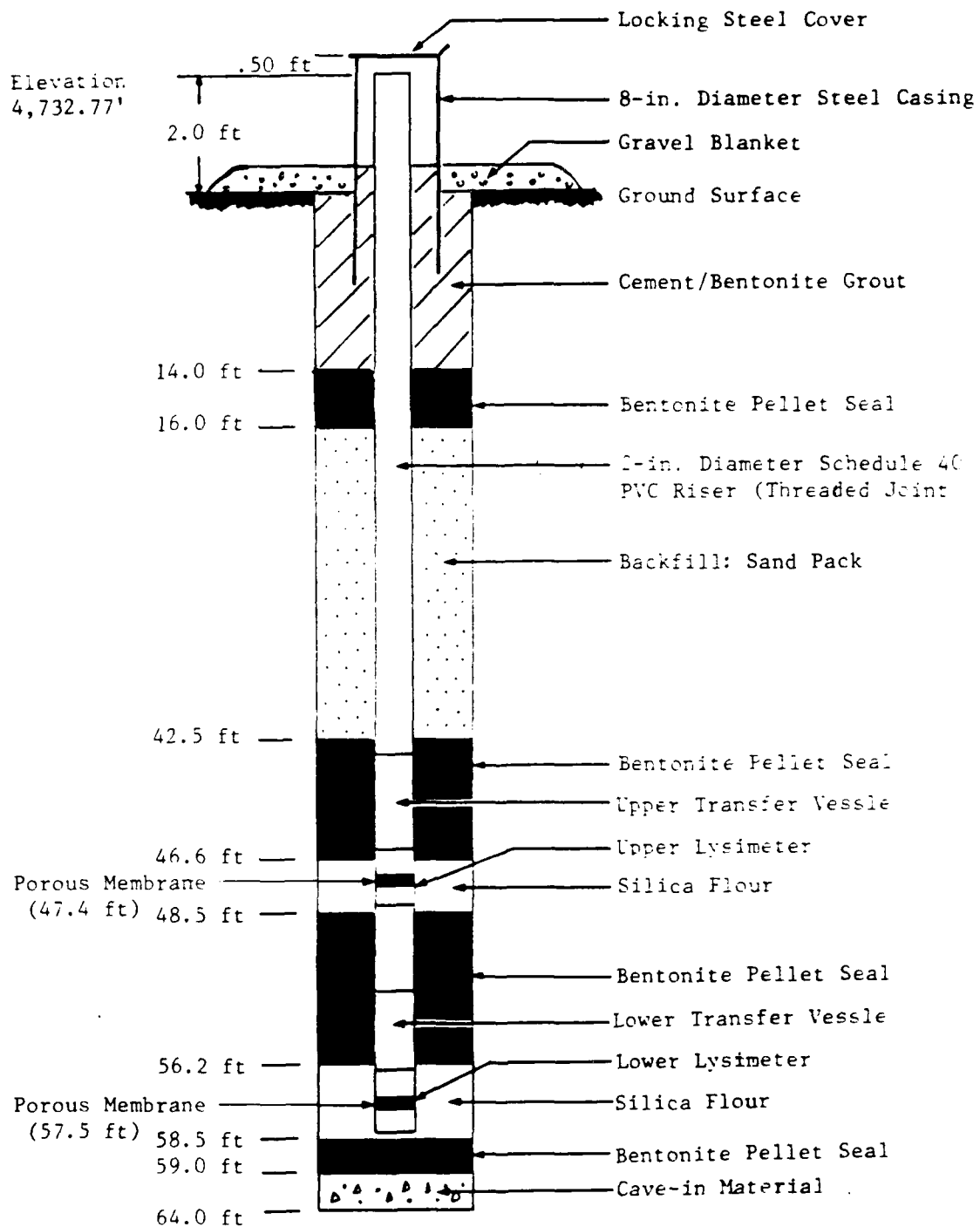
Samplers: _____

Sampling Date: _____ Time: _____

Sample Type: _____ Split? _____ With Whom: _____

Comments and Observations: _____

COMPLETION DIAGRAM LYSIMETER N-3D2



TOOELE ARMY DEPOT, UTAH

DRILLING CONTR *Sergent, Hastings and Beckwith*
Driller: *Jim Carter*

BY *Tom Fort*
DATE *7/2/87* CHK'D BY *[Signature]*



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____
Surface Elevation: _____
Casing Above Surface: _____
Reference Elevation: _____
Reference Description: _____

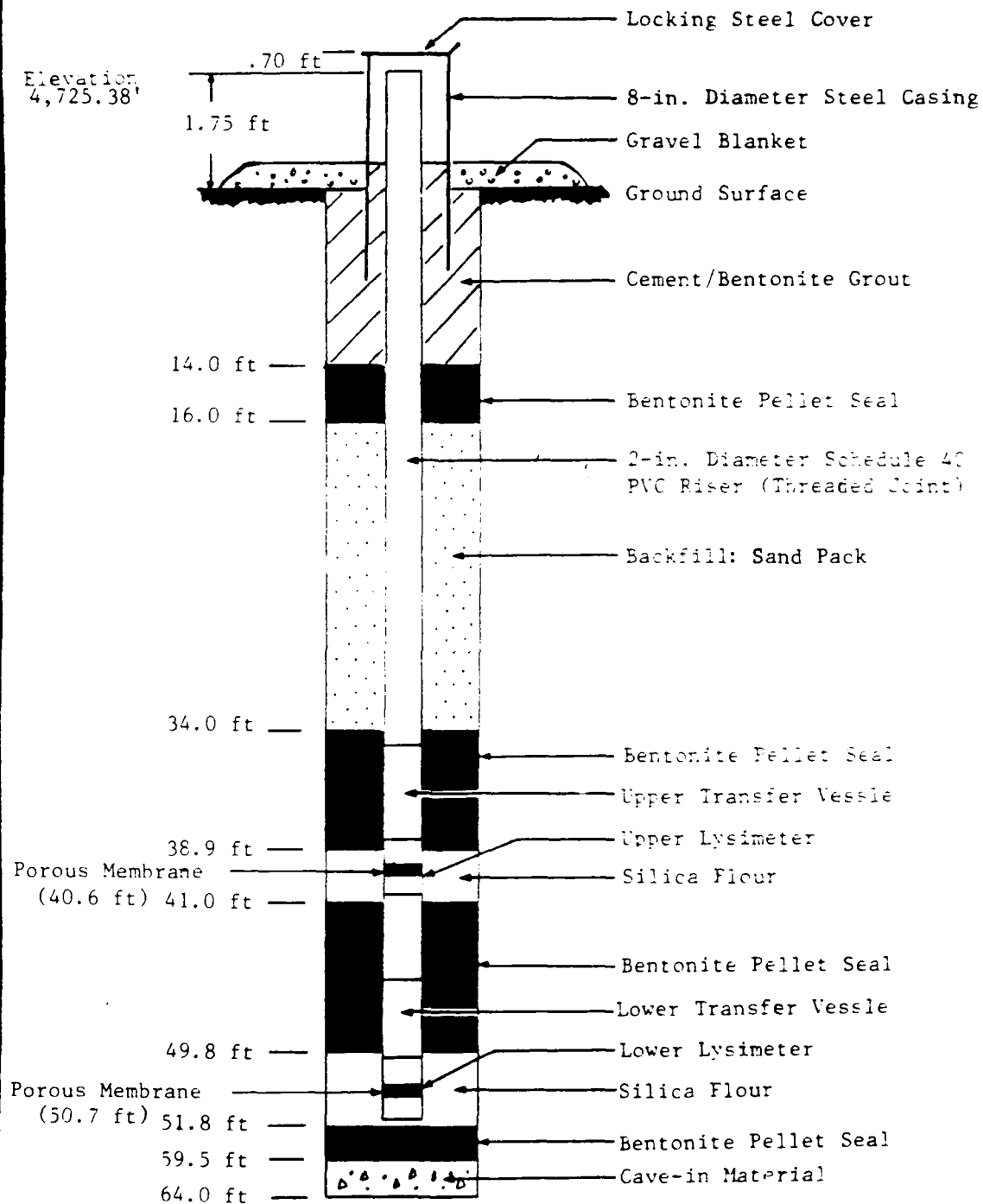
JOB NO. <i>THASIE</i>	CLIENT <i>USATHAMA</i>	LOCATION <i>TEAD-N</i>
DRILLING METHOD: <i>Truck mounted CME-</i>		BORING NO. <i>N-302</i>
<i>750 Drill rig: 6"-ID / 10"-OD</i>		SHEET <i>1 of 1</i>
<i>Hollow stem Auger</i>		DRILLING
SAMPLING METHOD: <i>2" STANDARD</i>		START TIME <i>1300h</i>
<i>Split Spmn driven 24" w/</i>		FIN TIME <i>153</i>
<i>140 lbs hammer And 30" throw</i>		DATE <i>7-25-86</i>
WATER LEVEL		DA <i>7-2</i>
TIME		
DATE		
CASING DEPTH		

SAMPLER TYPE	INCHES DOWN RECORDED	DEPTH OF CASING	SAMPLE NO DEPTH	BLOWS/6 IN. SAMPLER	WELL COMPLE- TION	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

*Lysimeter Borehole N-302
located ~25 ft. EAST
of Borehole / well N-301.
Refer to Boring Log for
well N-301 for detailed
description.*

COMPLETION DIAGRAM

LYSIMETER N-3E



TOOELE ARMY DEPOT, UTAH

LEGEND

N-3E

Particle Size Identification

Boulders	12-in. diameter or more
Cobbles	3-12-in. diameter
Gravel	Coarse 3/4-3 in.
	Fine 1/4-3/4 in.
Sand	Coarse 2.0-4.75 mm (dia. of pencil lead)
	Medium 0.425-2.0 mm (dia. of broom straw)
	Fine 0.074-0.425 mm (dia. of human hair)
Silt	0.005-0.074 mm (cannot see particles)

Moisture Content

Descriptive Term	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Relative Proportions

Descriptive Term	Percent
Trace	1-10
Little	11-20
Some	21-35
And	36-50

NONCOHESIVE SOILS

(Silt, Sand, Gravel, and Combinations)

Density

Descriptive Term	N(a)
Very Loose	5 blows/ft or less
Loose	6-10 blows/ft
Medium Dense	11-30 blows/ft
Dense	31-50 blows/ft
Very Dense	51 blows/ft or more

COHESIVE SOILS

(Clay, Silt, and Combinations)

Consistency

Descriptive Term	N(a)
Very Soft	3 blows/ft or less
Soft	4-5 blows/ft
Medium Stiff	6-10 blows/ft
Stiff	11-15 blows/ft
Very Stiff	16-30 blows/ft
Hard	31 blows/ft or more

DRILLING CONTRACT
 Dr. 11/11/11
 Dr. 11/11/11

BY: Tom R. H. H.
 DATE: 11/11/11
 CINDY H. H.



EA ENGINEERING,
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 TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO. 71A51E		CLIENT USATHAMA		LOCATION TEAD-Nork	
DRILLING METHOD: 3 1/8" I.D. 6 3/8" O.D.				BORING NO. N-3E	
Hollow stem Auger: CME 75				SHEET 1 of 4	
Truck mounted drill rig				DRILLING	
SAMPLING METHOD: 2" Standard Split				START TIME 1300	
Spoon driven 24" w/a				FINISH TIME 0935	
14013 Hammer and 20" Throw				DATE 7/10/11	
WATER LEVEL				DATE 7/22/11	
TIME					
DATE					
REFERENCE					

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS/G. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
GRAB			1		0		Very pale orange (silt & silt) fine sand w/ little medium sand trace silt, dry loose
			2		1		
			3		2		
			4		3	SP	
			5		4		Very pale orange (silt & silt) fine sand as above: w/ occasionally some shells, no apparent bedding, dry
SS	24"		6	4	5		
	24"		7	6	6		
			8	10	7		
			9		8		
			10		9		
			11		10		
			12		11		
			13		12		
			14		13		
			15		14		
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			92		91		
			93		92		
			94		93		
			95		94		
			96		95		
			97		96		
			98		97		
			99		98		
			100		99		

Remarks: Sample 1 from surface to 1' using shovel.

Note: Auger Advance to 4' bgs.

2" S.S. driven from 4-6' w/ 20 Recor (R)

Note: Advanced auger to 9' bgs.

2" S.S. driven from 9' to 11' w/ 24" R

Very pale orange (silt & silt) first 5" sand as above last 19" silty sand: fine sand w/ little to some silt faintly bedded dry loose occasional rust staining

Note: Auger Advance to 14' drilling easily S.S. driven from 14-16' w/ 22" Recor

yellowish gray (silt & silt) silty sand as above dry

Note: Auger Advance to 19' S.S. driven from 19-21' w/ 22" R.

sandy silt light olive gray (silt & silt) silty sand as above faintly bedded moist loose



EA ENGINEERING,
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LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASIE

CLIENT

USATHAMA

LOCATION

TEAD-N

DRILLING METHOD:

BORING NO.

N-3E

SHEET

204

SAMPLING METHOD:

DRILLING

START FINISH

TIME TIME

2

DATE DATE

REFERENCE

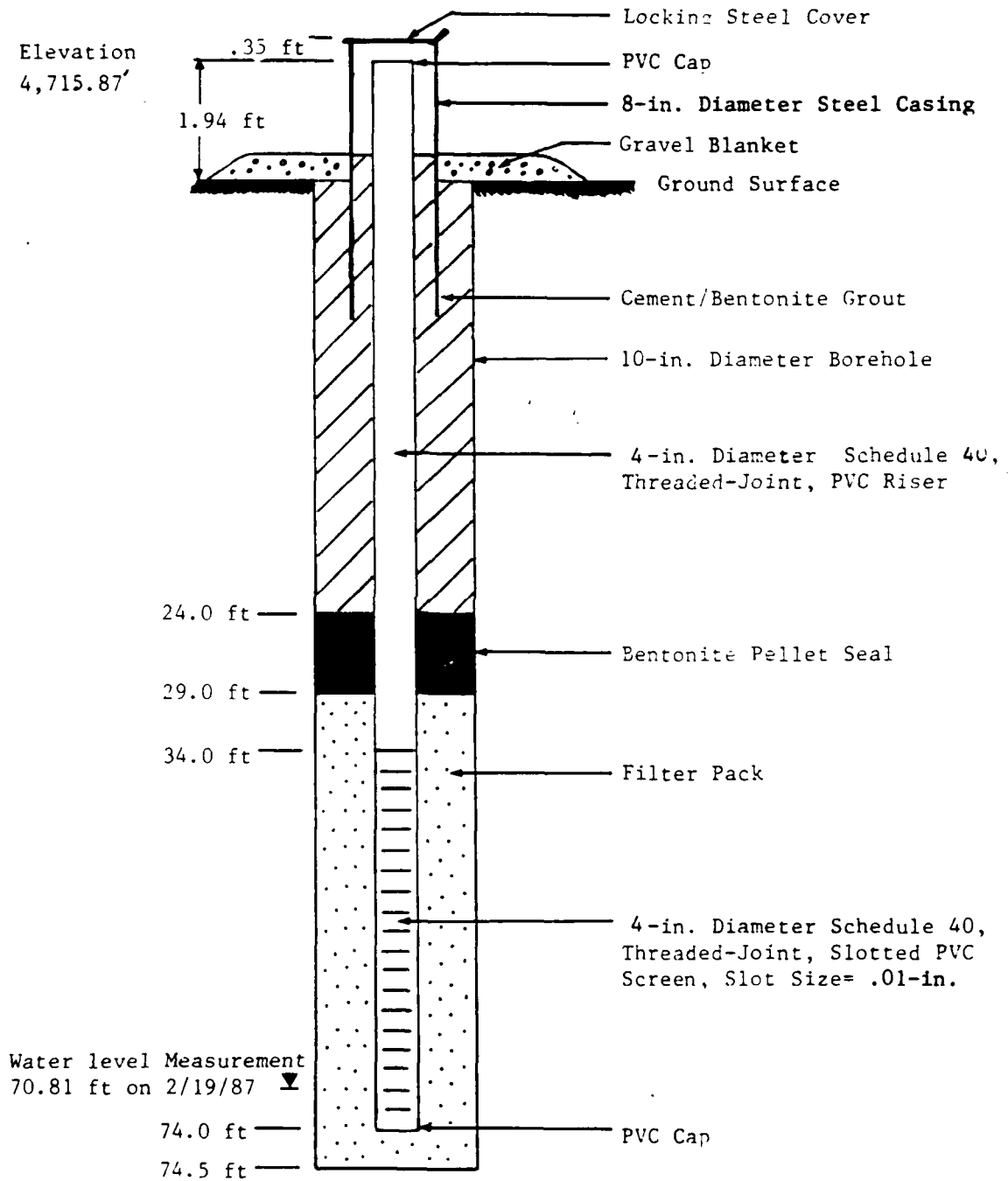
DRILLING CONTN J.H.P.B.
Jim Carter

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO	BLOWS/in. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
					20		
					1		
					2	ML	
					3		
					4		
SS	24"	6"	19	28	25		Aug 15 to 24" SS. driven from 24-26" w/ 24" R. 1st (54 1/2) S.S. harder to top 6" olive gray sandy drive in this silty sand as above material moist silt
					6	SP	Bottom 18" Medium to fine sand w/ trace silt dry no apparent bedding medium dense
					7		Note Augers Advant to 29" No change in drilling rate S.S. driven from 29-31" w/ 24" R.
					8	ML	
					9		light olive gray (54 1/2) Top 2" sandy silty moist thin bedded
SS	24"	7"	2	3	30	CL	last 22" layered beds of silty clay (4-6") and thin bedded clay silt w/ not little fine sand. wet, soft
					1	ML	Note Augers advance to 34" SS. driven from 34-36" w/ 24" R.
					2		
					3		
					4		
SS	24"	8"	6	6	35		Top 16" Moderate to dark yellowish brown (104 1/2) clayey silt thinly bedded silt w/ some clay trace to little fine to medium sand wet
					6	ML	last 8" light olive gray (54 1/2) silt w/ silt little sand and trace clay coming up auger. thin bedded layer of silty clay, moist - wet medium silt
					7		
					8		
					9		
SS	24"	9"	8	9	40		

BY: Jim P. for
DATE: 8/27/07 CINO: [signature]

COMPLETION DIAGRAM

WELL N-3F



TOOELE ARMY DEPOT, UTAH



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO. THASLE		CLIENT USA7HAMA		LOCATION TEAD-N	
DRILLING METHOD:				BORING NO. N-3E	
SAMPLING METHOD:				SHEET 3 of 4	
WATER LEVEL				DRILLING	
TIME				START TIME	
DATE				FINISH TIME	
REFERENCE				DATE	

SAMPLER TYPE	INCHES DEPTH	DEPTH OF CASING	SAMPLE NO.	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
					40		
				10	1		
					2	ML	
					3		
					4		
SS	24" / 16"		11	11	45		
					6		
					7		
					8		
					9	ML	
SS	24" / 22"		12	8	50		
			13	8	1		
				10	2		
					3		
					4		
					5		
SS	24" / 24"		13	13	55		
			14	15	6		
			15	26	7	ML	
				22	8		
					9		
					10	CL / MC	

DRILLING CONTINUED
3, H 3 B
Jim Carter

DATE 5/17/87
CIRCUIT BY [Signature]

Sandy silt: light clayey
silt w/ some fine sand and
little medium sand thin clay
bedded (thinly) several thin
layers of medium sand and oc
1 to 2" layers of clay w/ oc
moist dense
Note: Aug 15
Advance 2' to 39'
Standard Split Sp
divided from
39-41" w/
22" R.
Let hole sit
15 mins no
water.
Top 4" silt sand: yellowish gray
fine sand w/ little silt moist clay
Bottom 12" sandy silt: pale olive
silt w/ little to some fine sand
finely bedded moist.
Note: Aug 15
Set at 44'
10425.5
44-46" w/ 16"
R.
Note: Aug 15
Advance
to 49' 55"
divided from 39-5
w/ 22" R.
ended w/ auger
to 49' @
1435 hrs.
7-22-86
Regm. 0850 hrs.
checked for water (dry)
hole open to 39"
Added 12" Adapter to Regm.
note:
Advance auger to
55' above 55'
from 55 to 58'
w/ 24" R.
fale olive (10492)
sandy silt as above
occasional thin layers
of silty sand w/
medium sand. Some
rust colored layers.
moist to wet, medium
dense



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THA 312

CLIENT

USATAMA

LOCATION

TEPD-N

DRILLING METHOD:

BORING NO.

N-3E

SHEET

4 of 1

SAMPLING METHOD:

DRILLING

WATER LEVEL

TIME

DATE

REFERENCE

START TIME

FINISH TIME

1300h 0955h

DATE DATE

7-16-86 7-22

DRILLING LENGTH
5' 4" 11"

SAMPLER TYPE	INCHES RECORDED	DEPTH OF CASING	SAMPLE DEPT	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
SS	24"	14"	60-62	5	0	LL	(SY 4/1)
				9	1	ML	Top 12" Clayey silt: olive gray silt w/ sand clay and trace a little fine sand - moist bottom 10" laminated silt w/ 1" layers clay and sandy silt. moist
				14	2		Advanced Auger to 60 S.S. driven from 60-62' w/ 24" R.
					3		
					4		Note Advanced to 65'
					5	SM	(N7) Silty sand: light gray fine sand w/ 1. the silt fairly bedded grades to fine to medium sand with 1. the to some silt, occ. thin beds of medium sand. rest colored areas moist - dry, dense
SS	24"	15 1/4"	65-67	16	6		S.S. driven from 65-67' w/ 16" R.
				27	7		
				28	8		
					9		
					10		
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		
					21		
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					92		
					93		
					94		
					95		
					96		
					97		
					98		
					99		
					100		

BY Tony Baker
DATE 5/2/87 CINDY BAKER

End boring at
65 feet @ 0955h
pulled auger
hole open to 55'

LEGEND

N-3F

Particle Size Identification

Boulders	12-in. diameter or more
Cobbles	3-12-in. diameter
Gravel	Coarse 3/4-3 in.
	Fine 1/4-3/4 in.
Sand	Coarse 2.0-4.75 mm
	(dia. of pencil lead)
	Medium 0.425-2.0 mm
Silt	(dia. of broom straw)
	Fine 0.074-0.425 mm
	(dia. of human hair)
	0.005-0.074 mm
	(cannot see particles)

Moisture Content

Descriptive Term	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Relative Proportions

Descriptive Term	Percent
Trace	1-10
Little	11-20
Some	21-35
And	36-50

NONCOHESIVE SOILS

(Silt, Sand, Gravel, and Combinations)

Density

Descriptive Term	N ^(a)
Very Loose	5 blows/ft or less
Loose	6-10 blows/ft
Medium Dense	11-30 blows/ft
Dense	31-50 blows/ft
Very Dense	51 blows/ft or more

COHESIVE SOILS

(Clay, Silt, and Combinations)

Consistency

Descriptive Term	N ^(a)
Very Soft	3 blows/ft or less
Soft	4-5 blows/ft
Medium Stiff	6-10 blows/ft
Stiff	11-15 blows/ft
Very Stiff	16-30 blows/ft
Hard	31 blows/ft or more

DRILLING CONTRACT Sergeant, Hastings! Dr. L.W. H.
Dr. H. J. Carter

BY Tom for H
DATE 5/7/02 CHK'D BY Rag

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.						JOB NO. <u>THA 53E</u> CLIENT <u>CASA7HAMA</u> LOCATION <u>TEAD North Area</u>	
LOG OF SOIL BORING						DRILLING METHOD: <u>CMX-75 Trucl mounted</u> BORING NO. <u>B'N-3F</u>	
Co-ordinates: _____						drill rig using <u>Hollow-stem Auger</u> SHEET <u>1 of 4</u>	
Surface Elevation: _____						drilling method <u>10-in O.D 6-in ID</u>	
Casing Above Surface: _____						SAMPLING METHOD: <u>2-in diameter Standard</u> DRILLING	
Reference Elevation: _____						<u>Spl. 1 Spoon Sampler - Dr. ven 2' w/</u>	
Reference Description: _____						<u>140 lbs. Hammer 50" Throw</u>	
						WATER LEVEL	START TIME
						TIME	FINISH TIME
						DATE	DATE
						REFERENCE	7/1/06 7/1/02
SURFACE CONDITIONS: <u>Flat grass covered, dry.</u>							
REMARKS							
SAMPLER TYPE	INCHES DEPTH	DEPTH OF CASING	SAMPLE NO	BLOWS/B IN SAMPLER	DEPTH IN FEET	GRAPHIC LOG	
Grub			1	0.5	0	SP	Pale Yellowish Brown (10x4%) fine to medium sand trace silt. dry loose
					1		
					2		
					3		
SS	24" 20"		2	2	4	SP	Pale Yellowish Brown (10x4%) fine sand w/ trace to little silt v. loose dry
				4	5		
				7	6		
				10	7		
					8		
					9		
SS	24" 20"		3	7	10	SM	Yellowish gray (5x 7 1/2) fine sand w/ some silt loose dry
				8	11		
				9	12		
					13		
					14		
SS	24" 20"		4	6	15	SM	silty sand light olive gray (5x 6 1/2) fine sand and silt w/ trace coarse sand. loose moist.
				6	16		
				8	17		
				9	18		
					19		
SS	24" 10"		5	5	20		Greenish gray (5x 6 1/2) silt and fine sand occasional rust colored layers w/ trace clay moist loose
				5			
				7			



JOB NO

THASIE

CUENT

USA THANA

LOCATION

TEXAD - North

DRILLING METHOD:

BORING NO

WZEN-3F

SHEET

SAMPLING METHOD

2. 4

DRILLING

START

FINISH

TIME

TIME

WATER LEVEL

TIME

DATE _____

REFERENCE

DATE _____

DATE _____

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

DRILLING CONTR.

Jim Carbo

100-400

DATE 5/17/92 CHK'D BY [Signature]

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO DEPTH	BLOWS/6 IN SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
					20		
					1		
					2		
					3		
SS	24" 18"	6	5 8 13 15	25	4	SM SP	light olive gray (5Y 5/2) s. Hy sand: Top 1 foot fine sand and silt last 6" of sand w/ little silt medium dense moist.
					6		
					7		
					8		
SS	24" 24"	7	5 3 4 8	30	9	CL	light olive gray (5Y 5/2) Top 16" clay w/ some silt bottom 8" silt w/ little fine sand and trace clay occasional rust colored layers moist soft
					1		
					2	ML	
					3		
SS	24" 20"	8	2 2 3 4	35	4		light olive gray (5Y 5/2) silt w/ little fine sand and little clay. 1" layer of olive gray clay. moist soft
					6		
					7		
					8		
SS	24" 16"	9	6 11 9 9	40	9	ML SM	yellowish gray to light olive gray (5Y 7/1) sandy silt: silt and fine sand - medium sand loose to medium dense moist.



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO THASIE	CLIENT USA THAMA	LOCATION TEAD - N
DRILLING METHOD:		BORING NO N-3F
SAMPLING METHOD:		SHEET 3 of 4
WATER LEVEL		START TIME
TIME		FINISH TIME
DATE		DATE
REFERENCE		

SAMPLER TYPE	INCHES RECORDED	DEPTH OF CASING	SAMPLE NO DEPTH	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
					40	ML	
					1	SM	
					2		
					3	SP	
SS	24" 25"	10	13	7	4		<u>light olive gray (SY 5/2)</u> top 5" yellowish gray (SY 5/2) medium sand wet medium dense water in bottom last 19" clay w/ some b. it wet. stiff
				7	5		Note: 45 feet @ 0930 hrs let hole sit 15 min. water in bottom of hole @ 44.9' BLS.
				7	6	CH	Driller noticed change in drilling ease @ 44 feet BLS
					7		
					8		
S.S.	24" 18"	11	8	9	9	SM	light olive gray (SY 5/2) 6" of light clay wet stiff 6" silty sand: fine sand w/ some b. and s. it
				9	50		bottom 6" yellowish gray (SY 7/2) sand: medium with some fine sand. loose wet
				8	1	SP	
					2		
					3		
SS.	24" 10"	12	3	6	4	CL ML	light olive gray (SY 5/2) clay and s. it w/ little to some fine sand soft occasional layers of fine sand wet.
				6	55		
				8	6		
					7		
					8		
SS	24" 16"	13	17	16	9	ML	Yellowish gray (SY 8/1) sandy silt: s. it and fine to medium sand trace of medium gravel dense dry
				14	60		
				20			

DRILLING CONTR **S.H. 3B**
Driller: **J. A. Carter**

BY **John B. Ter**
DATE **5/17/87** CHK'D BY **[Signature]**

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOH NO

THA 51 E

CLIENT

USATHANA

LOCATION

TEAD-N

DRILLING METHOD

BORING NO

U-3F

SHEET

4 of 4

SAMPLING METHOD

DRILLING

START	FINISH
-------	--------

TIME	TIME
------	------

WATER LEVEL

TIME

DATE _____

REFERENCE

DATE	DATE
------	------

[illegible]

SURFACE CONDITIONS.

Remarks

note: @ 59 feet
BLS drilling changed
to hand.

Yellowish gray (548/1)
Grassy silt w/ trace
to little fine sand
very stiff. dry

yellowish gray to light olive
gray (54 6/2) fine
sand w/ little to some
silt dry dense

Note: 745' BLS
refusal w/ 23.

light olive gray (5 y $\frac{3}{2}$)
sand fine w/ little medium
sand and trace to little
silt 4" layer of
clay. dry v. dense

ended Bare hole
of 79.5 lbs
1200 lbs.

DRILLING CONTRA 5,143.0
TIN CAN 100

DATE 5/7/82 CHK O

WELL CONSTRUCTION

Date 7/1/86

Geologist Tom Porter

Job Number THA 51

Client USATHAMA

Well Number N-3F

Sergeant, Hawkins & Beckwith

Driller Jim Carter

Lic. # _____

Drilling Method Hollow-stem Auger

Protective Cover yes or no
Type Steel

Bore hole diameter
10"

Length of well stick up 1.80 F

Sealing Material
Grout

Riser pipe diameter 4-in.

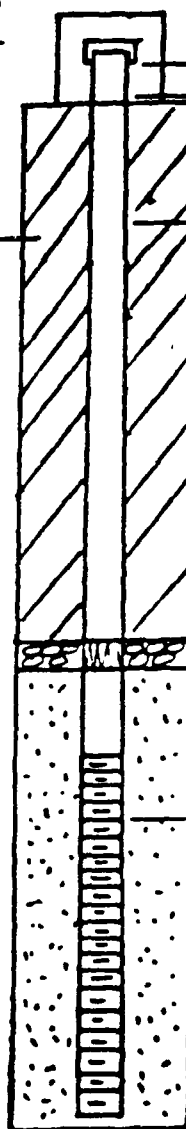
Riser pipe length from 34.0 to

Type Cement-Bentonite

Proportions

10 parts cement
1/2 part bentonite

Depth from 24.0 to Ground Surface



Bentonite Pellets/Slurry
from 29.0 to 24.0

Filter pack from 74.5 to 29.0

Screen diameter 4-in

Slot size 0.01"

Screen set from 74.0 to 34.0

Total hole depth 74.5'

LABOR & MATERIALS

1. Cement 11 bags

Drilling hours _____

2. Bentonite _____ bags

Well construction hours _____

3. Sand 22 bags

Steam clean hours _____

4. Bentonite pellets 4 5 gal buckets

Well Development

Well #: N-3F

Weather - Sunny ~ 85-90°F

Date Well Installed: 7-2-86

<u>Development Time</u> :	7-3-86	7-16-86	7-22-86	7-23-86
	1000 hrs - 1100 hrs.	1530 - 1630	throughout day (2 hrs)	0730 - 013.
	(1 hr.)	(2 hrs)		(1 hr)

<u>Static Water Level</u> :	7-3-86	7-16-86	7-22-86	7-23-
	1000 hrs	1400 hrs	1315 hrs	1700
	dry	72.95	73.00 - 72.90	73.00
				72.95

Well and Borehole Vol.

PH And Spec. Conductivity: Did not take S.C. of PH readings because water was induced to try and stimulate recharge to develop well.

Well Depth And Screen Length: From top PVC well depth 75.95' w/ 1.94' slickup 40' of PVC screen.

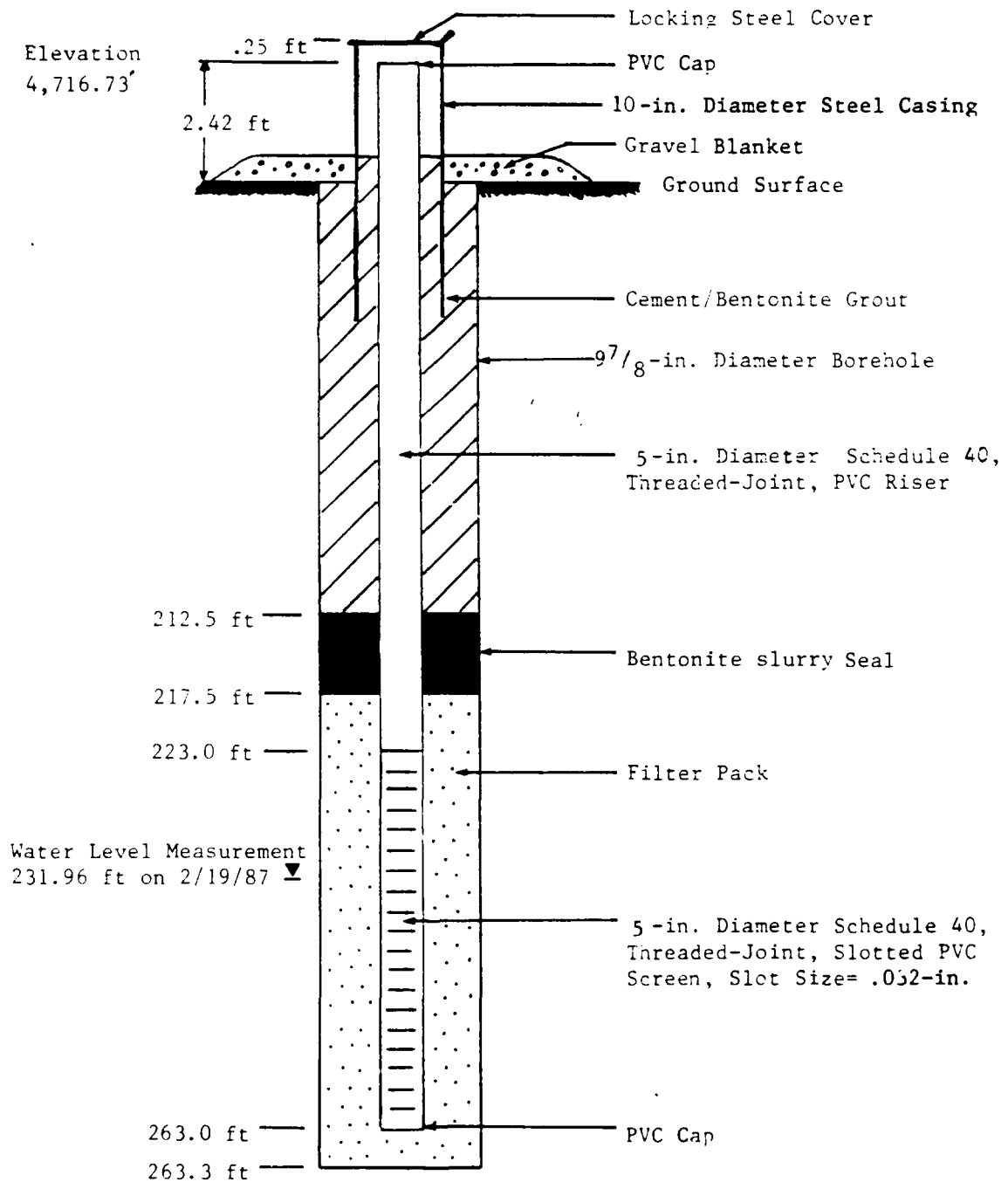
Development Description: ~150 gal. of water was added to try and induce recharge into well by agitating screened interval by surging with 3" x 10' ^{PVC} bailer. 15 gal. was removed from well before well went dry. After sitting water level well returned to 73.00' bgs. Additional water was bailed from well using a 2" x 2' teflon bailer during drilling operation.

Quantity of Water Removed:

7-3-86	15 gal.
7-16-86	5 gal.
7-22-86	7 gal.
7-23-86	2 gal.
	29 gal. tot.

COMPLETION DIAGRAM

WELL N-3H



TOOELE ARMY DEPOT, UTAH

LEGEND

N-34

Particle Size Identification

Boulders	12-in. diameter or more
Cobbles	3-12-in. diameter
Gravel	Coarse 3/4-3 in. Fine 1/4-3/4 in.
Sand	Coarse 2.0-4.75 mm (dia. of pencil lead) Medium 0.425-2.0 mm (dia. of broom straw) Fine 0.074-0.425 mm (dia. of human hair)
Silt	0.005-0.074 mm (cannot see particles)

Moisture Content

Descriptive Term	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Relative Proportions

Descriptive Term	Percent
Trace	1-10
Little	11-20
Some	21-35
And	36-50

NONCOHESIVE SOILS

(Silt, Sand, Gravel, and Combinations)

Density

Descriptive Term	N ^(a)
Very Loose	5 blows/ft or less
Loose	6-10 blows/ft
Medium Dense	11-30 blows/ft
Dense	31-50 blows/ft
Very Dense	51 blows/ft or more

COHESIVE SOILS

(Clay, Silt, and Combinations)

Consistency

Descriptive Term	N ^(a)
Very Soft	3 blows/ft or less
Soft	4-5 blows/ft
Medium Stiff	6-10 blows/ft
Stiff	11-15 blows/ft
Very Stiff	16-30 blows/ft
Hard	31 blows/ft or more

DRILLING CONTINUED FROM PREVIOUS PAGE

BY JOHN KOSLOSKI
DATE _____



LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO. THA 51E		CLIENT USATHAMA		LOCATION ARM NORTH AREA	
DRILLING METHOD: DRILL TECH D 40K				BORING NO. N-3H	
TOP DRIVE MUD ROTARY 6" BT TO 30H; 20" BT TO 18; 14" BT TO 12; 10" BT TO 8					
SAMPLING METHOD: 4" DIAM 18" LENGTH				1 of 14	
SPLIT SPON N DRIVEN				DRILLING	
N. = 200' AIR HAMMER				START	FINISH
WATER LEVEL				TIME	TIME
				0700	1000
TIME				DATE	DATE
				7-10-86	7-10-86
REFERENCE LS					

SAMPLER TYPE	INCHES DEPTH BELOW SURFACE	DEPTH OF CASING	SAMPLE NO. & DEPTH	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
					0		SUNNY 80¹⁵; SURFACE SANDY SOIL
					1		PINK IN PLACES; NEAR ARMAD 160.
					2		JUST OFF DIRT ROAD.
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					10		
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

6" DRILL BIT
ADVANCED TO
80' BY 1200 H.
NO PROBLEMS ENC.
7-10-86

CUTTINGS REVEAL
MOSTLY SAND
TAN-BR.
NO SAMPLES
TAKEN UNTIL

Refer to well N-3
log for 1st 40'.



EA ENGINEERING,
SCIENCE AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THATIE

CLIENT

USATHAMA

LOCATION

TEAD-N

DRILLING METHOD

BORING NO

N-3H

SHEET

2 of 14

SAMPLING METHOD

DRILLING

START FINISH

TIME TIME

WATER LEVEL

TIME

DATE

REFERENCE

DATE DATE

DRILLING CONTINUED

LANG Drilling
PAT ETL

SAMPLER TYPE	INCHES RECORDED	DEPTH OF CASING	SAMPLE DEPTH	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG
					20	
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					29	
					30	
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					39	
					40	

SURFACE CONDITIONS:

45-50 VISCOSITY
DRILLING FLUID US
BENT + WATER
= 1" BAGS TO 300
GAL
WATER

CUTTINGS STILL
REVEAL MOSTLY
BROWN, FINE-MED SAND,
SOME SILT
NO LARGE FRK
OR GRAVEL
NOTICEABLE IN
CUTTINGS.

DRILL BIT
ADVANCING W.
LITTLE-NO RESISTANCE

DATE _____ CURED BY _____

BY

Wann Kostas



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THA 51E

CLIENT

USATHAMA

LOCATION

TEAD-N

DRILLING METHOD

BORING NO.

N-3H

SHEET

3 of 14

SAMPLING METHOD

DRILLING

START

FINISH

TIME

TIME

WATER LEVEL

TIME

DATE

DATE

DATE

REFERENCE

DRILLING CONTINUED LANE Drilling

PAT. 0772

SAMPLER TYPE
SAMPLE DEPTH
DEPTH OF CASING
SAMPLE NO.
BLOWS/IN. SAMPLER

DEPTH IN FEET

GRAPHIC LOG

SURFACE CONDITIONS:

BY John D. Smith
DATE _____

CHECKED BY

DATE

0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
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25
26
27
28
29
30
31
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42
43
44
45
46
47
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49
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51
52
53
54
55
56
57
58
59
60

CUTTINGS REVEAL
BROWN SAND S.A.
(SAME AS
ABOVE)

DRILLING
PROCEEDING
SMOOTHLY -
NO PROBLEM.



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASIE

CLIENT

USATHAMA

LOCATION

TEAD-N

DRILLING METHOD:

BORING NO.

N-3H

SAMPLING METHOD:

SHEET

4 of 19

DRILLING

START

FINISH

WATER LEVEL

TIME

DATE

REFERENCE

TIME

TIME

DATE

DATE

DRILLING LENGTH LANE Drilling
PA7 LRTL

BY John Kurlaski

DATE _____

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
					60	SP	
					1		
					2		
					3	SP/ML	
					4		
					5	SP	
					6		
					7		
					8		
					69		
					70		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					79		
					80	SP	
S.S.	18/18		1	80'			

SOME SILT &
CLUMPS CLAY
IN CUTTINGS.
62-64'

HOMOGENEOUS - NO BEDDING OR LAMINATIONS;
DRY; FINE G. SAND
PALE YELL-BR 10YR 6/2
2 5% FINES (SILT)
NOT RUST COLORED
(NO OXIDATION)

DRILLING CONTINUED
LANG DRILLING
PAT ERTL

BY John Kosloski
DATE _____
CIRCD BY _____

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.					JOB NO. THASIC		CLIENT USATHAMA		LOCATION TEAD-N		
LOG OF SOIL BORING					DRILLING METHOD:					BORING NO. N-34	
Co-ordinates: _____					SAMPLING METHOD:					SHEET 5 of 19	
Surface Elevation: _____					WATER LEVEL					DRILLING	
Casing Above Surface: _____					TIME					START TIME	
Reference Elevation: _____					DATE					DATE	
Reference Description: _____					REFERENCE					DATE	
SAMPLER TYPE	INCHES RECORDED	DEPTH OF CASING	SAMPLE NO. DEPTH	BLOWS/8 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:				
					80						
					1	SP					
					2						
					3						
					4		DRILLING STOPPED				
					5		AT 1900 HRS				
					6		AFTER SAMPLING				
					7		AT 90' (1-1/2 H. DR)				
					8		DRILL RESUMED				
					9		0700 HRS 7-11-86				
					90	SP	DRY-MOIST, PALE PELL BR 10 YR G/2				
SS	18/18		2/10		1		FINE GR SAND; NO RUST COLORING; HOMOGENOUS - NO BEDDING OR LAMINATIONS; 5% FINES (SILT)				
					2						
					3						
					4						
					5						
					6						
					7						
					8	GM	ROUNDED GRAVEL IN CUTTINGS, PRE DUE TO FLUVIAL DRILLING HARDER				
					99						
					100						



JOB NO.		CLIENT				LOCATION	
TRASIE		WATHAMA				TEAD-N	
DRILLING METHOD:						BORING NO.	
						N-3K	
SAMPLING METHOD:						SHEET	
						6 of 14	
						DRILLING	
WATER LEVEL						START	FINISH
TIME						TIME	TIME
DATE						DATE	DATE
REFERENCE							

Reference Description: _____

SAMPLER TYPE	INCHES DOWN	DEPTH OF CASING	SAMPLE NO.	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
SS	18 16		3 100		100	Gm	<p>DRY - MOIST BROWN 10 YR 6/2, 1 SANDY - GRAVEL (10%) LARGE ROUNDED SAND SUB-ROUNDED FRAGMENTS OF QUARTZ SOME RUST COLOR NO LAMINATIONS APPARENT PROBABLY FLUVIAL SEPU HERE</p>
					109		<p>1100 HRS SPOON DRIVEN 110-111.5' NO RECOVERY</p>
					110		<p>CLEAN GRAVEL IN EXHAUS SHAKER CUTTINGS. SAMPLE MOST LIKE FELL THROUGH OPS BETWEEN SPOON CATCHER</p>
					111	Gm	<p>SILT IN CUTTINGS 115-116.5'</p>
					112		
					113		
					114		
					115		
					116		
					117		
					118		
					119		
					120		

DRILLING CONTN LANG DRILLING
PAT EXPL

DATE _____ CURED BY _____
BY John Kestel



EA ENGINEERING,
SCIENCE AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO. THASIE	CLIENT USATHAMA	LOCATION TEAD - N
DRILLING METHOD:		BORING NO. N-3H
SAMPLING METHOD:		SHEET 7 of 1
WATER LEVEL		DRILLING
TIME		START TIME
DATE		FIN. TIME
REFERENCE		DATE

DRILLING CONTRACT
LANG DRILLING
PAT CRTZ

DATE
BY John Kosloski

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
SS	18/18	1/120			120	GM	WINDS TO THE SOUTH MOIST DOWN 10 YR 6/9 (15% SILT) SILTY GRAVEL, DRY RUST COLORED IN PLACES; NO LAMINATIONS APPARENT NO SAMPLE AVAILABLE (NO RECOVERY) AFTER DRIVING SPOON FROM 125-126.5' S.A. IN CUTTINGS.
SS	18/18	5/130			130	ML	CLEAN OLIVE 10 Y 6/2 PALE GREEN GRAY SILT W. DEFINITE LAMINATIONS & RUST OXIDATION THROUGHOUT, DRY 25% FINES SLIGHTLY FISSILE; COMPACT AT S.A. PROBABLY LACUS- TRINE SILT (FROM 128-137) GRAVEL AT 1. BY FEEL OF DRILL, WAS CONC. 6" BIT DOWN IN. (OVER)
SS	18/18	6/135			135	GM	DRILLING STOPPED (SAMPLING) 20" BIT TO 132' NO CASING 142' NO CLEAN TH TIT ADVANCED TO 1 (5') SET & GROUTED (16') ALL GROUTED CYCLES THERE APPEARS BE OXIDATION OF FROM 80' DOWN SILT LAYER AT SUGGESTED THAT ZONE IS NOT RE SAT.

* OXIDATION INDICATES SOME-TO-V. LITTLE
INFILTRATION OF WATER/MOISTURE
OCCURRING ~~AT~~ THROUGH SILT ALONG HORIZO
LAMINATIONS IN SILT AS EVIDENCED
BY A RUST COLORING OCCURRING ALSO
HORIZONTAL

THOSE LAMINATIONS.

HOWEVER SAMPLE IS DRY NOW.



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LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THA 612

CLIENT

USATHAMA

LOCATION

TEAD-N

DRILLING METHOD:

BORING NO.

N-3H

SHEET

8 of 14

SAMPLING METHOD:

DRILLING

WATER LEVEL

TIME

DATE

REFERENCE

START TIME

FINISH TIME

DATE

DATE

SAMPLER TYPE
INCHES
DEPT OF
CASING
SAMPLER
BLOW
BLOW/S IN.
SAMPLER

DEPTH
IN FEET

GRAPHIC
LOG

SURFACE CONDITIONS:

(DRILLERS ADDED CEMENT TO 18" CASING 7-11-85) DRILL. 5

PALE, YELL-BROWN 10YR 6/2 7-11-85

SILTY SANDY GRAVEL

NO RUST COLORING

APPEARANT.

15% SILT

15% SAND (F.SAND)

WATER LEVEL

NOTED AT 241.

BLD AT OLD

ERTEC DEEP WE

(ESTIMATED WATER

LEVEL HERE =

10' DIFF IN

ELEV.

USED AIR HAMMER

TO DRIVE SPOON

STILL DIFFICULT

TO DRIVE THE

GM. 30 min

AIR HAMMER IN

MUD LINE 7

RIG BROKEN.

FIXED IN 2

S.A. DRY

SPoon ATTEMPTED

AT 160.0 W.

NO RECOVER

S.A. IN CUT.

DRILLING CONTINUED AT ERTL

BY John Kosloski

DATE _____

CHECKED BY _____



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TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASIE

CLIENT

USATHAMA

LOCATION

LAC-N

DRILLING METHOD:

BORING NO.

N-3H

SHEET

9 of 14

SAMPLING METHOD:

DRILLING

WATER LEVEL

TIME

DATE

REFERENCE

START

TIME

DATE

FINISH

TIME

DATE

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO.	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
					160		INTO FORMATION
					1		MUD LOSS ESTIMATE
					2		HARD TO MAKE
					3		CAUSE MUCH LEAK
					4		OF MUD TO
					5		SURFACE WHILE
					6		TRIPPING RODS
					7		BUT IN 600 GAL
					8		THUS FAR
					9		
					10		
					11		
					12		
					13		
					14		
					15		
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					100		

DRILLING CONTINUED
PAT. 0072

BY John Koolbaki

DATE _____

DATE _____



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LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO. THASIE		CLIENT USATHAMA		LOCATION TEAD-N	
DRILLING METHOD				BORING NO. N-3H	
SAMPLING METHOD				SHEET 10 of 14	
WATER LEVEL				DRILLING	
TIME				START TIME	FINISH TIME
DATE				DATE	DATE
REFERENCE					

SAMPLER TYPE	WATER LEVEL RECORDED	DEPTH OF CASING	SAMPLE NO. DEPTH	BLOWS/LR. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
					180		SPCON ATTEMPTED
					1		W. NO RECOVERY
					2		CUTTINGS SPCON
					3		S.A.
					4		
					5		
					6		DRILL STOPPED
					7		CN 7-14-86 AT 18
					8		H.
					189		7-15-86
					190		OTSO DRILL
					1		COMMENCED
					2		SPCON ATTEMPTED
					3		NO NO RECOVER.
					4		CUTTINGS S.A.
					5		
					6		
					7		NATURAL
					8		MOISTURE LEVEL
					199		HARD TO
					200		DETERMINE ONL
							MUD ROTARY
							CUTTINGS
							MONITORED NO

DRILLING CONTINUED

1416
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1500

DATE _____

CHECKED BY _____

BY

John Kestel



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LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THRSIE

CLIENT

USATHAMA

LOCATION

TEAD-N

DRILLING METHOD:

BORING NO.

N-3H

SHEET

11 of 14

SAMPLING METHOD:

DRILLING

WATER LEVEL

TIME

DATE

REFERENCE

START FINISH

TIME TIME

DATE DATE

SAMPLER
TYPE

WATER
RECOVERY

DEPTH OF
CASING

SAMPLE
NO.

BLOWS/IN.
SAMPLER

DEPTH
IN FEET

GRAPHIC
LOG

SURFACE CONDITIONS:

DRILLING CONTINUED
LAT 6-5-76

CUTTINGS

DATE
BY John Kostas

					200		
C			10		1	GM	S.A. SPOON, ATTEMPTED 200' - SPOON REF. + NO RECOVERY - BOTTOM LIP OF SPLIT SPOON CHIPPED
					2		
					3		15% SILT 15% F. SAND
					4		1230 HRS - DIFFICULTY REMOVING HAMMER FROM TOP ROD - FORCE OF AIR HAMMER (DRIVING INTO HARD GRAVEL) HAMMERED SCREEN THREADS TOGETHER. 1 HR TO REMOVE.
					5		
					6		
					7		
					8		
					9		
					10	GM	S.A. SPOON ATTEMPTED AT 201' - SPOON REFUSAL & NO RECOVERY. AT THIS DEPTH, EVEN W. USE OF AIR HAMMER DRIVING SPOON, TOT. RODS LENGTH IS SO LONG THAT ENERGY OF HAMMER BLOWS ARE DISSIPATED THROUGH ROD & HOLE BEFORE REACHING SPOON - NO FORCE AVAILABLE FOR DRIVING SPOON, ESPE IN THIS HARD GRA
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		



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LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO. THASIE		CLIENT USATHAMA		LOCATION TEAD-N	
DRILLING METHOD:				BORING NO. N-3H	
SAMPLING METHOD:				SHEET 12 of 14	
WATER LEVEL				DRILLING	
TIME				START TIME	
DATE				FINISH TIME	
REFERENCE				DATE	

SAMPLER TYPE	INCHES DEPTH	DEPTH OF CASING	SAMPLE NO	BLOWS IN SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS	
SS	6/3		12/220		220	DRY - MOIST PAL YELLOW - BK DTK 6/2 MED GR. SANDSTONE BOULDER W. DARK IGNEOUS MINERALS - PROBABLY HORNBLAND OR OLIVINE, MAROON COLORED IN PLACES,	DRILLING HARD AT 220 SPOON DRIVEN INTO SS. BOULDER 220 - 221.5	
					1			
					2			
					3			
					4	GM		
					5			
					6			
					7			
					8			
					229			
SS	12/7		13/230		230	GM	S.R. GRAVEL AGAIN 20% SILT 10% SAND (FINE) 5% CLAY	TOO DIFFICULT TO DECIPHER LEVEL OF SATURATION OF SAMPLE. NOT ENOUGH OBTAINED X MUD FROM DRILL FLUID AS APPEARED TO PENETRATE INTO GRAVEL
					1			
					2			
					3			
					4			
					5			
					6			
					7			
					8			
					239			
					240			

DRILLING CONTRACT
2476
VAT 611

BY: John Kosloski
DATE: _____
CIRCUIT: _____



EA ENGINEERING,
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LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASIE

CLIENT

USATHAMA

LOCATION

TERO-R

DRILLING METHOD:

BORING NO.

N-3H

SHEET

13 of 14

SAMPLING METHOD:

DRILLING

WATER LEVEL

TIME

DATE

REFERENCE

START FINISH

TIME TIME

DATE DATE

SURFACE CONDITIONS:

DRILLING CONTINUED
PAT. 0872

SAMPLER TYPE	INCHES BORE RECORDED	DEPTH OF CASING	SAMPLE DEPTH	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG
SS	6 3		14 240		240	GM
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					10	
					11	
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					60	

S.A.
APPEARS SAT.
BY 1756L
~~1756L~~

1ST SAMPLE THAT
SATURATION COULD
BE DETERMINED
(OTHER THAN SAT. BY DI
STOPPED DRILL
1830 7-15-86

1 1/2 DRILL
HR DAY

RESUMED

DRILL 0915

7-16-86

~~S.A.~~
S.A. NO SURPRISES.
SAME GRAVEL /
CONSISTENT
DOWN THROUGH
BORING.

SPOON SAMPLE
ATTEMPTED.
NO RECOVERY
POSSIBLE

DATE _____

CHECK BY _____

BY John Kosloski



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASIE

CLIENT

USATHAMA

LOCATION

TEAD-N

DRILLING METHOD:

BORING NO

N-3H

SHEET

14 of 19

SAMPLING METHOD:

DRILLING

START

FINISH

WATER LEVEL

TIME

TIME

TIME

DATE

DATE

REFERENCE

DATE

DATE

DRILLING CONTINUED

DATE

DATE

SAMPLER TYPE	WATER LEVEL	DEPTH OF CASING	SAMPLE NO	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG
C.			16		26.0	GM
			25		1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					26.9	
					27.0	
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					27.9	
					28.0	

SURFACE CONDITIONS:

259-260 CUTTINGS
S.A.

NO SPOON
ATTEMPT
AT 260

ENDED DRILL
1200 HRS 7-16-8

BOH = 263.0

NO LOSS OF HOLE
THUS FAR.

ONCE HOLE, BORED
TO 263.0 MUD
CIRCULATED FOR
1 HRS.

40 FT. OF SCREEN
SCHD 80 3/2 SLOT
PLACED FROM

263-223, RISER
223-221 ALS.

6X9 GRAVEL PACK (GSI)
PLACED (TREMIE)

W. 2" TREMIE PIPE
FROM 263-217.5.

217.5. CEMENT GA
212.5-2 SURFACE

*SEE WELL DIAGRA

TOTAL MUD LOSS
LOW = 1000 GAL.
DURING DRILLING

IN-WELL

*NO WATER
TABLE INFO.
AVAILABLE TILL
WELL PUMPED
OF DRILLING
MUD.

Development
FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: TEAD-NORTH AREA TNT WAREHOUSE FACILITY

Well No: N-3H Gauge Date: 7-22-86 Time: 0730 hrs.

Weather: Sunny hot 85-90°F

Well Condition: Sound, gravel bed around well. Cement to surface,
4 posts and fence around well, steel protective casing and 6" cap.

Well Diameter (inches): 5" PVC well in 9 1/8" Pipe Hole

Odor (describe): None

Sounding Method: sub. indicator
weir at top Measurement Reference: Top PVC

Stick up/down (ft): 2.21' (PVC)

(1) Well Depth (ft): 265.21' Purge Date: 7-22 7-24-86 Time: 1015 hrs. ^(began 7-22-86)

(2) Depth to Liquid (ft): 233.9' ^{Development} Purge Method: Bailed w/ 3"x10' PVC Bailer
and 4" Grap-Haus Submersible per

(3) Depth to Water (ft): - Purge Rate (gpm): Varied

(4) Liquid Depth [(1)-(2)]: 31.31' ^{Development} Purge Time (min): 26 hr

(5) Liquid Volume [(4)xF] (gal): 288.4 gal. Purge Volume (gal): 1359.5 gal.
^(5"x bore hole and well vol.)

Did Well Pump Dry? Describe: After development for well was
able to be pump @ slow rate without pumping dry.

Samplers: _____

Sampling Date: _____ Time: _____

Sample Type: _____ Split? _____ With Whom: _____

Comments and Observations: _____

Well Development

Well #: N-3H

Date Well Installed: 7-16-86

Development Time: 7-22-86 (1015 hrs. - 1845 hrs. $\frac{3}{4}$ hrs. lunch)

7-23-86 (0700 hrs. - 1730 hrs.)

7-24-86 (0700 hrs. - 1000 hrs.) (1235 hrs. - 1815 hrs.)

Static Water Level: 7-22-86 197' (drilling mud)

7-23-86 @ 0730 hrs 233.90' 7-25-86 @ 0730 hrs 233.8'

Well And Borehole Vol.

5" well: $31.31'$ (water column) $\times 1.02$ gal./ft = 31.9 gal. $\times 5 = 159.7$ gal.

Annular Vol betw/

5" well and $9\frac{3}{8}"$ O.H.: $31.31'$ (water column) $\times (2.74$ gal./ft $\times 30\% \text{ porosity}) = 25.7 \times 5 = 128.$

pH And Spec. Conductivity:

5" X Borehole and well Vol = 288.5

7-22-86	Time	pH	Spec. Cond.	7-24-86	Time	pH	Spec. Cond.
	1030	10.32	1700	0900	7.69	280	
7-23-86	1600	7.31	220		0930	7.70	290
7-24-86	0730	7.49	230				

Well Depth And Screen Length:

265.21 w/ 2.21' stickup (PVC)

40' of well screen.

Development Description: On 7-22-86 we with drilling mud in well @ 197'. Discharge after first 10 gal. very thick mud clump of bentonite mud coming out of well. After brilling in 40 gal. Well. mud @ 148.0 (below screen level and water table.) On 7-23-86 well stirred making water brilling becomes easier. By 1700 hrs. we were able to get down to bottom. Discharge silty but a lot thicker. During pumping a lot of sand coming out discharge. Would pump at slow rate for a while then surge by quickly pumping 10 to 15 gal. at a time. Repeated. By 1040 7-24-86 discharge visibly clear. From

Quantity of Water Removed:

1235 hrs. - 1815 allowed pump to run at 25 gpm.

7-22-86 Brilled 42 gal.

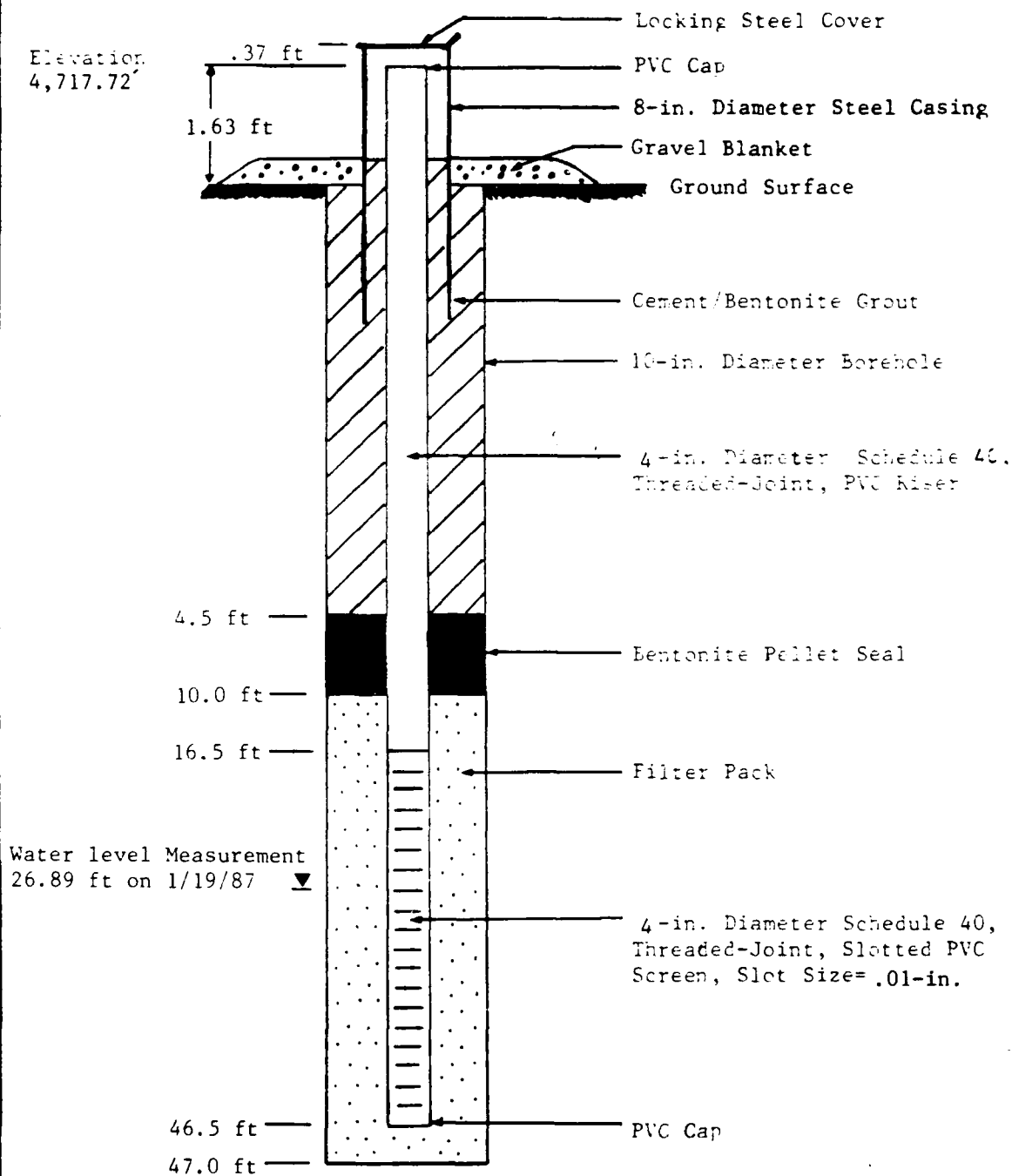
7-23-86 Brilled 130 gal.
pumped 110 gal.

7-24-86 pumped 1077.5 gal.

Tot. 1359.5 gal.

COMPLETION DIAGRAM

WELL N-31



TOOELE ARMY DEPOT, UTAH

LEGEND

N-3E

Particle Size Identification

Boulders	12-in. diameter or more
Cobbles	3-12-in. diameter
Gravel	Coarse 3/4-3 in.
	Fine 1/4-3/4 in.
Sand	Coarse 2.0-4.75 mm (dia. of pencil lead)
	Medium 0.425-2.0 mm (dia. of broom straw)
	Fine 0.074-0.425 mm (dia. of human hair)
Silt	0.005-0.074 mm (cannot see particles)

Moisture Content

Descriptive Term	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Relative Proportions

Descriptive Term	Percent
Trace	1-10
Little	11-20
Some	21-35
And	36-50

NONCOHESIVE SOILS

(Silt, Sand, Gravel, and Combinations)

Density

Descriptive Term	N(a)
Very Loose	5 blows/ft or less
Loose	6-10 blows/ft
Medium Dense	11-30 blows/ft
Dense	31-50 blows/ft
Very Dense	51 blows/ft or more

COHESIVE SOILS

(Clay, Silt, and Combinations)

Consistency

Descriptive Term	N(a)
Very Soft	3 blows/ft or less
Soft	4-5 blows/ft
Medium Stiff	6-10 blows/ft
Stiff	11-15 blows/ft
Very Stiff	16-30 blows/ft
Hard	31 blows/ft or more



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TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASIC

CLIENT

USATHAMA

LOCATION

North-TEAL

DRILLING METHOD: CMC 750 Truck Mount

1.5 using hollow stem Auger

6.2" OD 3 3/8" ID

SAMPLING METHOD: STANDARD Split Spoon

2" Driven 24" w/ 140 lb

Hammer 2" Thion

WATER LEVEL 35.2

TIME 0830

DATE 8-1-86

REFERENCE Top M

BORING NO.

N-3J

SHEET

1 of 43

DRILLING

START

FINISH

TIME

TIME

DATE

DATE

7-29-86

7-29-86

SAMPLER TYPE	WATER BENTHOS	DEPTH OF CASING	SAMPLE NO	BLOWS/IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG
GIA			1		0	
			2		1	
					2	
					3	
					4	
SS	24"		2	7	5	
	16"		4	8	6	
				7	7	
					8	
					9	
SS	24"		3	15	10	
	22"		8-11	14	11	
				12	12	
					13	
					14	
SS	24"		4	8	15	
	24"		14-16	8	16	
				7	17	
					18	
					19	
SS	24"		5	15-21	20	
	24"				21	

SURFACE CONDITIONS:

Remarks:

Sand yellowish gray (5Y 7/2)
Medium w/ some fine
sand loose dry

Note: Advanced Augers
to 4' below ground
Surface (695) Stand
Split Spoon (S.S.)
Driven 24" w/ 140
lb hammer from
4'-6" w/ 12"
no apparent bedding loose recovery (R)
dry

Note: Augers Advanced
to 9' bgs S.S.
Driven from 9-11'
Top 16" Sand as Above w/ 22" R.
dry

Bottom 6" S.H. Sand:
yellowish gray (5Y 7/2)
fine to medium sand
w/ some S.H. dry
medium dense

Note: Augers Advanced
to 14' bgs S.S.
Driven from
14-16" w/
20" R.

Sandy S.H. pale olive
(10Y 6/2): S.H. w/
some fine to medium
sand faintly bedded
occasional rust colored
areas dry loose

Note: Augers
Advanced to 19' bgs
S.S. driven from
19-21" w/
20" R

S.H. (pale olive (10Y 6/2)
S.H. w/ little to some
fine to medium sand trace
to little clay trace
9' and large rust areas

DRILLING CONTINUED
Sergeant, Houshens - Beckwith
Driller: Ed Adams

BY: Tom B. H.
DATE: 8/1/86
CHK'D BY: [Signature]



EA ENGINEERING,
SCIENCE AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THASTE

CLIENT

LEATHAM

LOCATION

TEAD-N

DRILLING METHOD:

BORING NO.

N-31

SAMPLING METHOD:

SHEET

2 of 3

WATER LEVEL

TIME

DATE

REFERENCE

DRILLING

START

TIME

FINISH

TIME

DATE

DATE

SAMPLER TYPE	WATER SAMPLES RECORDED	DEPTH OF CASING	SAMPLE NO. DEPTH	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS
							Remark =
					10		Keep colored areas
					1		Top 10" dry bottom
					2		10" moist. thinly
					3		bedded loose
					4		Note: Advanced
					5		auger to 24'
					6		5.5' driven from 24-26'
					7		w/ 24" R.
					8		Sandy silt: pale olive
					9		Sp. came up
					10		100 g/p. 5 ft w/ some
					11		Wet on outside
					12		fine sand thin layers
					13		occasional layers of
					14		fine to medium sand w/
					15		Mud coming up
					16		1 1/2" silt. Wet to
					17		cut side of
					18		Saturated some rust coloring
					19		auger from
					20		10082 25'-29'
					21		Note: Advanced Auger
					22		to 29' 5.5.
					23		Sand: yellowish gray
					24		(54 3/4) Medium sand
					25		driven from 29-31'
					26		w/ some fine sand fine
					27		w/ 18" R.
					28		S.H. no apparent bedding
					29		Let hole sit
					30		top 12" wet-saturated
					31		for 15 mins. water
					32		bottom 6" wet medium
					33		in bottom of hole.
					34		Loose
					35		Note: Advanced Auger
					36		to 34' 5.5. driven
					37		from 34-36' w/ 18" R.
					38		S.H. Light olive gray
					39		(54 3/4) thinly layered
					40		Saturated silt coming
					41		up outside of
					42		w/ little medium to fine
					43		Auger from
					44		sand, little clay trace
					45		30-35'
					46		gravel wet soft
					47		Note: Auger Advance
					48		to 39'
					49		5.5. driven from
					50		39-41' w/ 20" R.
					51		Top 12" yellowish gray (54 3/4)
					52		clayey 2 ft w/ little
					53		fine sand soft

DRILLING CONTINUED

Ed Adams

BY Tom Porter

DATE 5/1/82 CHECKED BY RGP



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

JOB NO.

THA-51E

CLIENT

USATHAMIA

LOCATION

North - TCAD

DRILLING METHOD:

BORING NO

N-51

SHEET

3 of 3

SAMPLING METHOD:

DRILLING

START FINISH

TIME TIME

1215hrs

WATER LEVEL

TIME

DATE

REFERENCE

DATE

7-29-86 7-29-86

SAMPLER TYPE	INCHES DRIVER	DEPTH OF CASING	SAMPLE NO	BLOWS/6 IN. SAMPLER	DEPTH IN FEET	GRAPHIC LOG	SURFACE CONDITIONS:
					40	CL	Bottom 10" layered pale
					1	ML	olive clay (104 g/2) stiff
					2	etc	and clayey sandy silt
					3		pale olive wet stiff
					4	SP	Note: Advanced Auger to 44' 5.5
					5		5.5 driven from
					6		44-46' w/ 18" R.
					7		Sand pale olive gray
					8		(54 g/1) fine to medium
					9		cross-bedded sand w/
					10		trace to 1.4% s.H loose
					11		white making call
					12		trace gravel wet to Lap.
					13		bottom 3" clay more
					14		water level at 1035 hrs. 39.8'
					15	CH	Note: Advanced Auger to 49' 6.5
					16		5.5 driven from
					17		49-51' w/ 20" R.
					18		Top 14" Clay Pale olive
					19		(104 g/2) moist stiff
					20		Bottom 8" Sandy silt
					21		1.1% olive gray (54 g/1)
					22		Ended bore hole
					23		5.11 w/ some fine sand
					24		at 49'
					25		trace clay moist. soft
					26	ML	Pulled hole
					27		stayed open to
					28		only 39' 6.5.
					29		Reamed hole down
					30		to 47' w/ 10"
					31		Augers. Ended
					32		bore hole at 47' hole
					33		open to 46'
					34		at 1215 hrs.
					35		
					36		
					37		
					38		
					39		
					40		

DRILLING CONTINUED SHEET 2

DATE 5/1/87 CHK'D BY JEP

BY Tom Porter

WELL CONSTRUCTION

Date 7-29-86

Geologist Tom Porter

Job Number THAS1

Client USA TAMA

Well Number N-31

Driller Ed Adams

Lic. # _____

Drilling Method 50' rent, Haulson & Feickert

Hollow stem Auger

Bore hole diameter

10"

Sealing Material

Cement

Type Cement

Bentonite Powder

Proportions

10 parts cement

4 part bentonite

Depth from 6.5 to 4.5

4.5

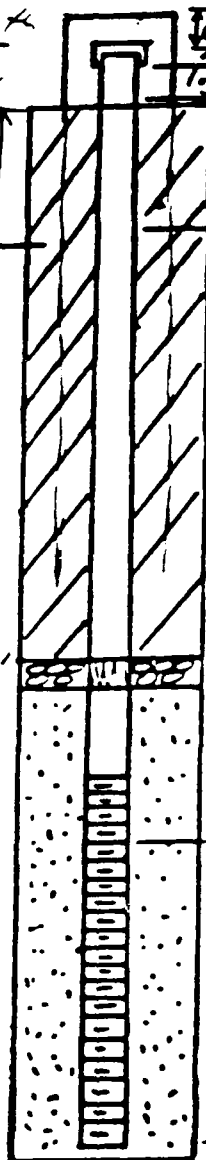
5.5

6.5

*

30'

↓



Protective Cover yes or no

Type Steel Stickup

Length of well stick up 1.3

Riser pipe diameter 4-in PVC

schedule 40

Riser pipe length from _____

= 18.13'

Bentonite Pellets/Slurry, from 10 to 4.5

Filter pack from 47' to 10'

Screen diameter 4-in PVC

schedule 40

Slot size 0.01"

Screen set from 46.5' to 16.5'

Total hole depth 3-in Augers

49'

10-in Augers

47'

LABOR & MATERIALS

1. Cement 4 bags
2. Bentonite .25 bags
3. Sand 14 bags
4. Bentonite pellets 2 5 gal buckets

Drilling hours _____

Well construction hours _____

Steam clean hours _____

Development
FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: TEAD-NORTH AREA TNT WAREHOUSE

Well No: N-31 Gauge Date: 7-30-86 Time: 0730

Weather: Sunny, hot ~ 80-85°F

Well Condition: Sound, protective steel casing, ^{with 1 inch cap.} gravel around
well and part of fence surrounding well.

Well Diameter (inches): 4" PVC well in 10" bore hole

Odor (describe): None

Sounding Method: ^{CED WATER} Level Indicator Measurement Reference: Top PVC

Stick up/down (ft): 16.3'

(1) Well Depth (ft): 46.6' Purge Date: _____ Time: _____

(2) Depth to Liquid (ft): 35.20' ^{Development} Purge Method: 3" x 40' PVC Discharge

(3) Depth to Water (ft): — Purge Rate (gpm): Varied

(4) Liquid Depth [(1)-(2)]: 11.4' ^{Development} Purge Time (min): 1 1/2 hrs

(5) Liquid Volume [(4) x F] (gal): 92.8 ^{Development} Purge Volume (gal): 95 gal.
(= x bore hole ms well Vol.)

Did Well Pump Dry? Describe: Well during boring works
for 2 days after N152 gal.

Samplers: _____

Sampling Date: _____ Time: _____

Sample Type: _____ Split? _____ With Whom: _____

Comments and Observations: _____

Well Development

Well #: N-31

Date Well Installed: 7-29-86

Development Time:

7-29-86
15 min.

7-30-86 1 hr.
~~65 min.~~

7-31
15 min.

Static Water Level:

7-30-86 @ 0730 35.6'

7-31-86 @ 0930 hrs 35.2'

Well And Borehole Vol.

4" Well: 11.4' (Water Column) \times .6528 gal./ft = 7.44 \times 5 = 37.2 gal.

Annular Vol. betw. 4" well and 11" O.H.: 11.4' \times (3.25 \times 50% porosity) = 11.13 \times 5 = 55.6 gal.

PH And Spec. Conductivity:

5x Borehole and well: 92.8 gal.

Well Depth And Screen Length:

46.6' Stickup 1.63'

Development Description: While bailing first 15 gal. disch. very silty and sandy. On 7-30-86 discharge was cloudy, by end of day discharge only slightly cloudy. 7-31-86 discharge only slightly cloudy to transparent.

Quantity of Water Removed:

7-29-86 Bailed 15 gal.

7-30-86 Bailed 80 gal.

7-31-86 " 1530 gal.
95 gal.

Development
FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: TEAO - North Area

Well No: N-3A Gauge Date: 7-23-80 Time: 1615 hrs.
(ERTEC DEEP)

Weather: Sunny 80°F Thunder storm @ end of day.

Well Condition: Protective steel casing w/ locking cap
Surrounded
Cement to surface, surrounded by 4 post and fence.

Well Diameter (inches): 4" PVC well 10" Bore hole (According to
ERTEC Report)

Odor (describe): None

Sounding Method: Water level indicator
well log Measurement Reference: Top PVC

Stick up/down (ft): 2.28'

(1) Well Depth (ft): 339.28 ^{Develop} Purge Date: 7/23-25 Time: —

(2) Depth to Liquid (ft): 243.6 ^{Developed} Purge Method: Entered by 3"x10' PVC ^{BA} ~~with~~

(3) Depth to Water (ft): 95.68' Purge Rate (gpm): ~ 6 gpm ^{4' ERTEC plus submersible pump}

(4) Liquid Depth [(1)-(2)]: — Purge Time (min): ~ 7 hrs.

(5) Liquid Volume [(4)xF] (gal): — Purge Volume (gal): 1160 gal.

Did Well Pump Dry? Describe: No, were able to pump well
(at 5 to 6 gpm without much drawdown.)

Samplers: —

Sampling Date: — Time: —

Sample Type: — Split? — With Whom: —

Comments and Observations: —

—

—

Well Development

Well #: N-3A (E-tec deep)

Date Well Installed: 1982

Development Time: 7-23-86

1630 - 1700 hrs

7-24-86

0700 - 1145

7-25-86

0900 - 1115 hrs.

Static Water Level: 7-23-86

243.5 @

7-25-86

1300 hrs 243.6'

Well And Borehole Vol.

4" PVC well: 95.68' (anda column) \times .6528 gal./ft. = 62.46 gal.

Annular Vol. Btry

4" well and 10" o.h.: 95.68' \times (3.16' \times 30% porosity) = 90.67 gal.

PH And Spec. Conductivity:

7-25-86	Time	PH	Spec Cond.
	0900	7.03	480
	1100	7.23	480

Well Depth And Screen Length:

339.28' Static 2.28'

40' of screen.

Development Description:

During bailing water discharge was slightly cloudy w/ some ^{benzene} but was able to go completely to bottom of hole.

During pumping ~~red~~ discharge started out slightly cloudy however clear after pumping only a short time.

Was able to pump at a fairly dis rapid rate without much drawdown.

Quantity of Water Removed:

7-23-86 bailed 55 gal.

7-24-86 bailed 215 gal.

7-25-86 pump 90 gal.

Tot. 1160 gal

Well Development

Well #: N-38 (ertec)
shallow

Date Well Installed: 1987

Development Time:

7-7-86 : $\frac{3}{4}$ hrs.

Static Water Level:

7-7-86 : 56.87 (top of PVC) 7-9-86 : 56.78' $\frac{1}{2}$ hr. 7-23-86 : 56

Well and Borehole Vol:

PH And Spec. Conductivity: Did not get PH or Spec.
Cond readings: Only small amounts of water
from well at a time and full of bentonite.

Well Depth and Screen Length: Well set @ 56.4' below ground surface
with 2.32' stickup and 20' of well screen.

Development Description: On 7-7-86 well was bailed by
hand to check recharge of well water contained
bentonite. Recharged fairly slowly.

Try well bailed on a other occasion but
recharge rate did not allow for continuous bailing
well ^{did} not ^{yield} ^{enough} water to clean up
bentonite (very cloudy)

Quantity of Water Removed:

7-7-86 $\frac{1}{2}$ gal.

7-9-86 1 gal.

7-23-86 $\frac{3}{4}$ gal.

2 1/4 gal.

APPENDIX I-D

PRODUCT INFORMATION FOR TIMCO LYSIMETERS

RECEIVED JUL 16 1986

—COMPLETE MONITORING LINE
—SAMPLERS
—LYSIMETERS

TIMCO MFG., INC.

851 FIFTEENTH STREET
PRAIRIE DU SAC, WISCONSIN
53578

—PVC SAND POINTS
—PVC WELL SCREENS
—SCREENS FOR DEWATERING

Telex # 9109970034
Area Code 608-643-8534

AN ALL TEFLON LYSIMETER SYSTEM FOR HAZARDOUS WASTE FACILITIES UTILIZING ANGULAR INSTALLATIONS

INTRODUCTION

The disposal of hazardous wastes and its consequences has become one of the nation's most pressing problems. It is an issue constantly in the news and in the public mind and rightfully so. Hazardous wastes in the past have gone uncontrolled leaving large numbers of improperly constructed landfills abandoned to cause future occurrence of groundwater contamination.

Present and proposed landfills are now being licensed for approval. Still, at best, these sites are temporary structures. It is not a question of if they will leak, but one of preventing groundwater contamination when they do leak. If properly monitored and operated, hazardous waste landfills can be a safe means of storing hazardous waste.

In the past monitoring only occurred after reports had already been made regarding a change in groundwater quality. Recently, through the use of vacuum pressure lysimeters, monitoring of the vadose zone (unsaturated zone) has allowed detection of leachate movement long before contamination of the groundwater aquifer (saturated zone) occurs. This allows control and even elimination of the contamination before it reaches the aquifer. Vadose zone monitoring therefore is an excellent preventative technique.

This paper deals with monitoring of the vadose zone utilizing an innovative angular installation method as an early warning detection of possible contamination. This is a preventative step since monitoring of the saturated zone may be a step too late. There are however problems and risks in any monitoring situation.

Any hole drilled into a hazardous waste site serves only to promote the chance of contamination. The actual drilling process can allow cross contamination of zones. Even if drilling doesn't cause this problem, it opens the future possibility of channelization. The borehole thus is acting as a pathway for leachate movement.

Drilling into a hazardous waste site can also be dangerous healthwise. It is unknown what chemicals can be expected at many hazardous waste

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sites. The chemicals may be explosive, flammable, or give off dangerous vapors which can be liberated as the site is penetrated. These chemicals can be inhaled or absorbed through the skin with or without knowledge, causing severe health problems.

Timco has developed an angular system utilizing an all Teflon lysimeter for vadose zone monitoring. The innovative angular installation is good for abandoned, active and new landfill sites. If properly employed this unit can act as an early detection unit and can be the first step in preventing groundwater contamination.

The angled system is a custom designed unit. It can and has been designed for installation for 0° to 60° from the vertical. The angled system is comprised of a Teflon Cup or tube lysimeter, a transfer vessel and conduit system to transport the sample to the surface. This conduit system should be flushthreaded casing to protect the vacuum/pressure and sample tubing running to the surface.

The lysimeters used in the angled systems are Timco's 100% virgin Teflon tube type or cup type lysimeters (Fig. 1 & 2). These units are 17.5 inches (444.5mm) long. Sizes available are 2.375 inches O.D. (60.33mm) and 1.90 inches O.D. (48.26mm) for the tube type, 1.90 inches O.D. (48.26mm) and 1.05 inches O.D. (26.67mm) for the cup type lysimeter.

The actual tube lysimeter is constructed in five sections (see Fig. 1):

1. Bottom Plug
2. Blank casing
3. Porous PTFE tube filters
4. Blank casing
5. Top plug with tubing connectors

The cup type lysimeter is constructed in three basic sections (see Fig. 2):

1. Porous PTFE cup filter
2. Blank casing
3. Top plug with tubing connectors

Both units are modular in design. By unscrewing the units at the filter they can be easily cleaned and decontaminated. The top plug can also be threaded to receive threaded casing which provides a conduit for the vacuum-pressure tubing to travel to the surface.

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The porous medium is virgin Teflon with an average pore size of 50 microns (Castro and Timmons 1983). This pore size was found to be the optimum determined by comparative studies at Timco during the development of the Timco lysimeters (Timmons 1982). The porous Teflon filter has been tested for performance in comparison with cup type ceramic filters. There is greater versatility in the Teflon filter in that it may be constructed in a tubular form. This allows for more surface area contact. Once the sample is obtained and the vacuum has dissipated, it remains contained without the possibility of sample loss. The comparative testing (Timco 1983) concluded that susceptibility to clogging of the ceramic filter was 3.5 times greater than for the Teflon filter.

The 100% virgin Teflon filter lysimeter is chemically inert which insures the longevity of the complete monitoring installation.

The basic lysimeter may be installed vertically to a depth of 20 feet. For installation at deeper depths, a Timco transfer vessel is employed in tandem with the lysimeter. The transfer vessel is utilized to transport the sample from the lysimeter to the surface. This is necessary since the pressure needed to force the sample to the surface from below 20 feet could damage the contact area (silica pack) between the filter media and the soil (see Fig. 3).

The transfer vessel prohibits this from happening. Very little pressure is needed to transport the sample from the lysimeter to the transfer vessel inches above, then the pressure needed to raise the sample to the surface is applied to the transfer vessel which is a closed system. This allows for vadose zone monitoring at greater depths without damage occurring.

Laboratory testing has shown that the transfer vessel check valve will hold at angles up to 60 degrees, plus or minus 2 degrees, from the vertical with as little as 50 to 100 ml of sample in the vessel (Timco lab 1984).

Timco recommends that the installation utilizing the transfer vessel be at an angle no greater than 60 degrees, plus or minus 2 degrees, from the vertical to allow for variances due to drilling and installation.

As with many installations each situation is different, requiring extensive consideration and custom design. The angled lysimeter system

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employs a standard lysimeter and a standard transfer vessel capable of adaptation for these individual installations. Although some adaption or custom fitting may be required, the basic form of the system remains the same. The basic system is seen in (Fig. 4).

The basic system consists of the Teflon tube lysimeter and Teflon transfer vessel attached by two solid Teflon rods. Attached to the top of the transfer vessel is a piece of adapter casing. This piece can be PVC, Teflon or Stainless Steel and is used to adapt the angled system to the casing which then continues up to surface. If the casing extends out of the area of investigation, it can be constructed of PVC or Stainless Steel, but if the casing material is a possible source of contamination then Teflon casing should be used. This casing allows for the attachment of centralizing units and carries the pressure/vacuum and sample tubes to the surface. An outer casing can be used as pictured, to allow the angled system to be pulled should the need arise (Fig. 5).

This lysimeter design can and has been installed at different waste sites. The units have been utilized at operating sites, abandoned sites, and at new sites before landfilling had occurred. What gives the system the flexibility to be installed in such a variety of situations, is its ability to vary the degree of angle, up to 60 degrees from vertical.

Once the extent of the landfill and liner is known and the site of the borehole and the location of the lysimeter are identified, all that is needed is an angle that connects the two points. This is where the angled system excels. This system allows the lysimeter to be located at the necessary angle without the borehole penetrating the landfill or the liner. In situations where leachate has already been discovered, additional study and planning should be completed before drilling so there is no cross contamination into another zone.

In newly constructed sites this lysimeter system has been utilized in a slightly different way (Fig. 6). The lysimeter system is installed vertically while the conduit to the surface is installed at an angle. This unit is set in a vertical borehole at the bottom of the landfill. Then the conduit pipe is attached by an elbow and brought to surface level where monitoring will occur. The liner is then installed over the entire system so that sampling can be achieved without penetration of the liner.

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INSTALLATION

Installation of the lysimeter system is basically the same, no matter what the angle. The only variance occurs in methodology. The following describes the standard installation procedure.

The sampling and pressure/vacuum lines are attached to the lysimeter assembly. The unit is then tested by immersion in distilled water at which time pressure is applied. If leakage exists at any fittings it is then detected and the unit should be replaced.

A slurry of 200 mesh silica flour and distilled water at a ratio of 450 g silica to 150 ml water is then mixed. With the 2.375 O.D. unit a six inch borehole is recommended which would take approximately 50 lb. silica flour and 2 gallons of distilled water per installation.

2-4 inches of the silica slurry are poured into the bottom of the borehole. The lysimeter system is set into the slurry and centrally located by centralizers. The rest of the silica slurry is then poured into the hole surrounding the entire lysimeter.

The bentonite seal is then placed above the silica pack. (Depending on the angle of installation, the silica slurry and bentonite seal may be tremied into place. On shallow vertical installations the silica slurry and bentonite pellets may be poured in). The hole is backfilled and the surface seal applied to the installation.

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CONCLUSION

Presently, no actual field data from the angled installations have been compiled by Timco. Firms which have successfully installed the angled lysimeters report that the units are performing as expected.

The use of the custom designed angled Teflon lysimeter installation in the vadose zone is state of the art technology. It is an excellent preventative measure in detecting leachate before it reaches the groundwater under existing or future hazardous waste and landfill sites.

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FIGURE #1

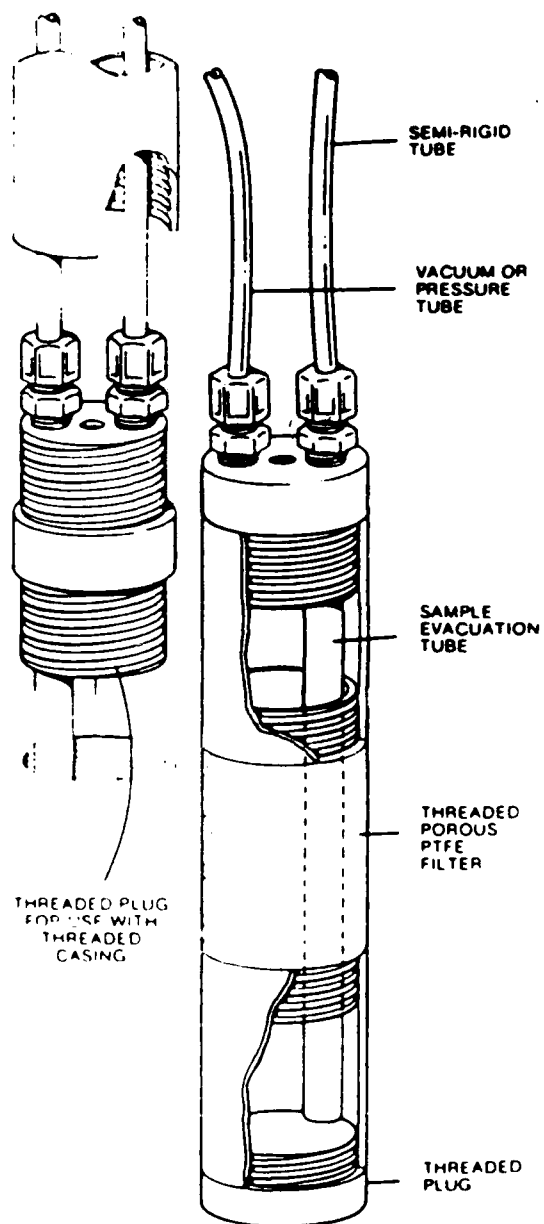


FIGURE #2

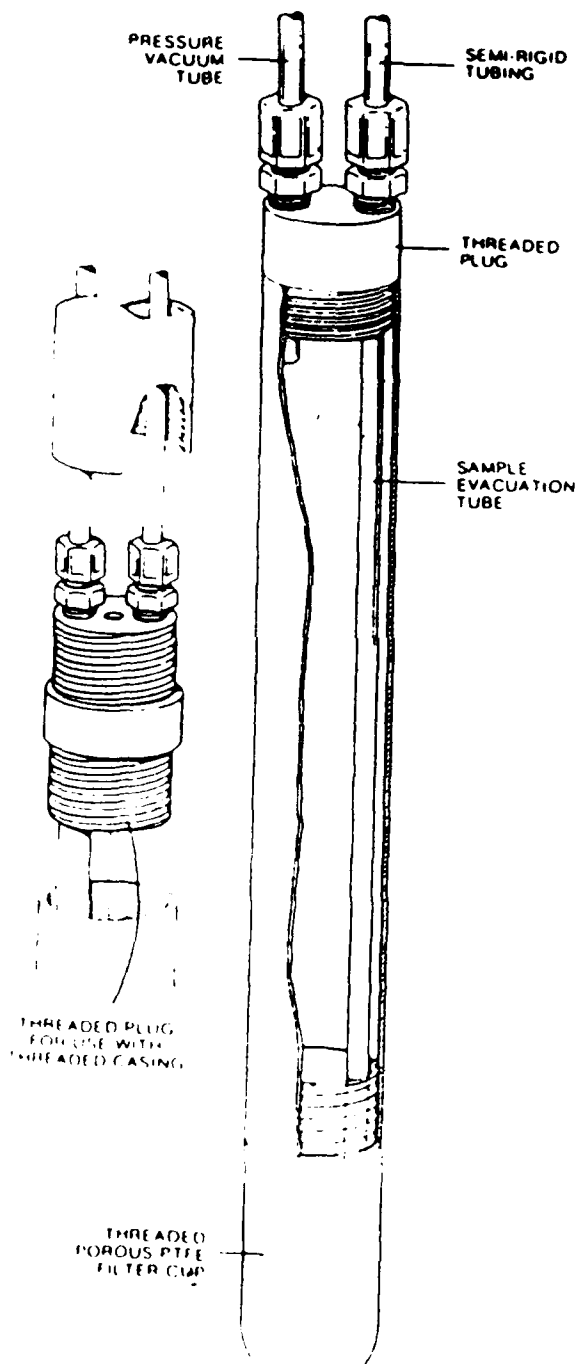


FIGURE 11

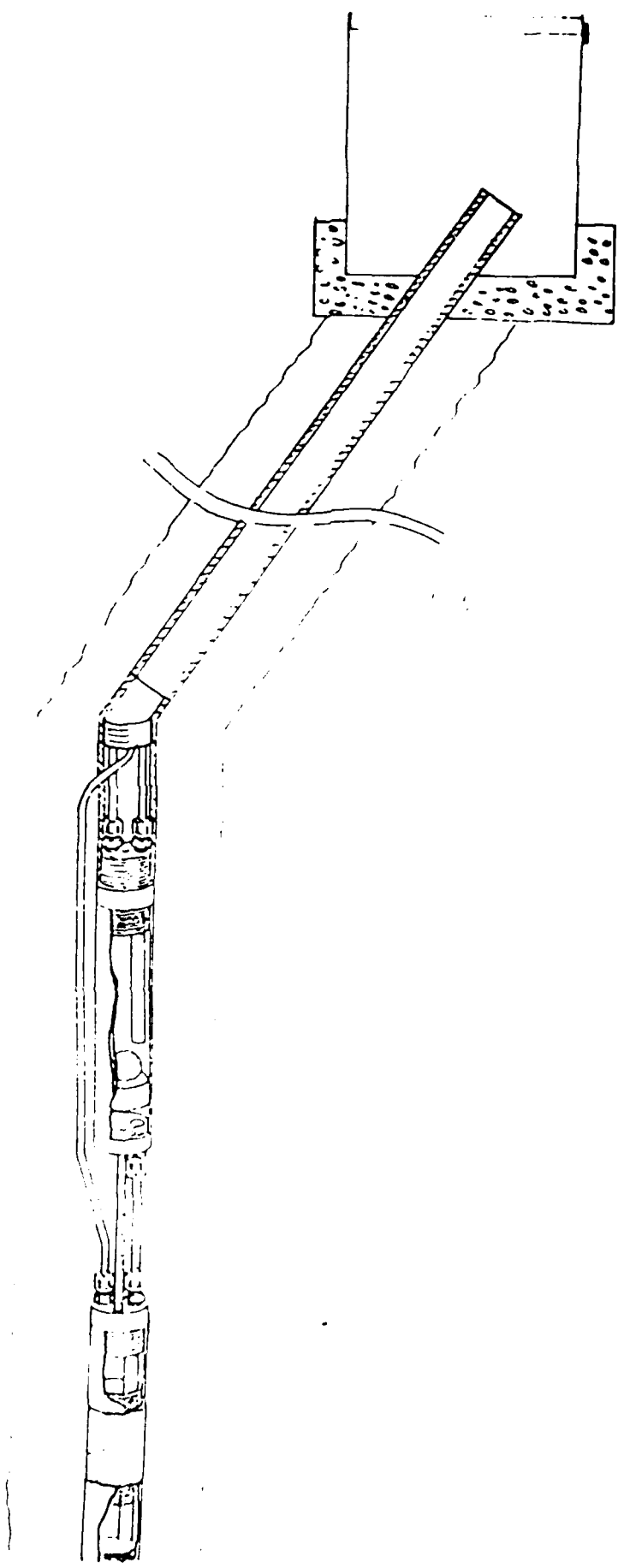


FIGURE #4

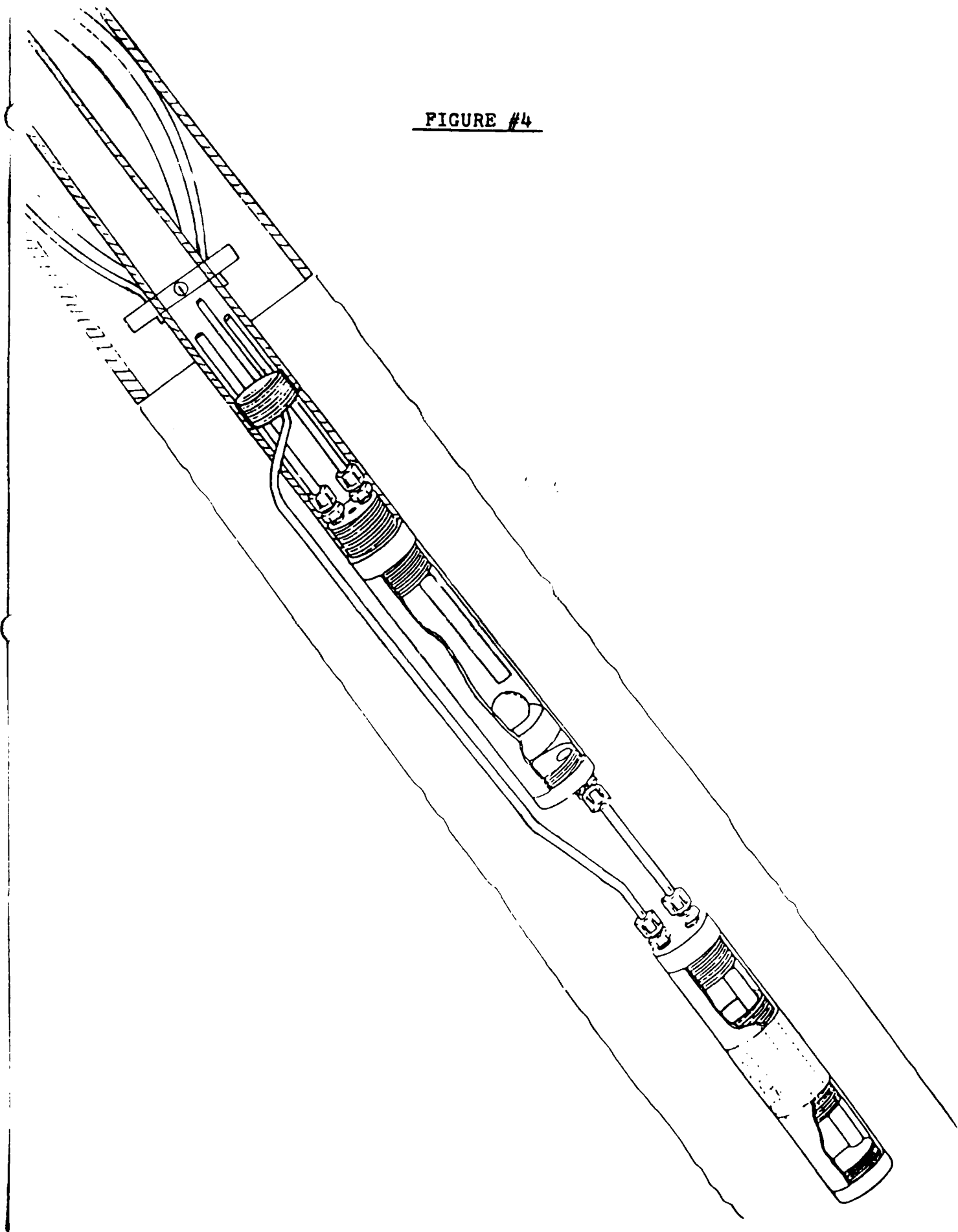


FIGURE #5

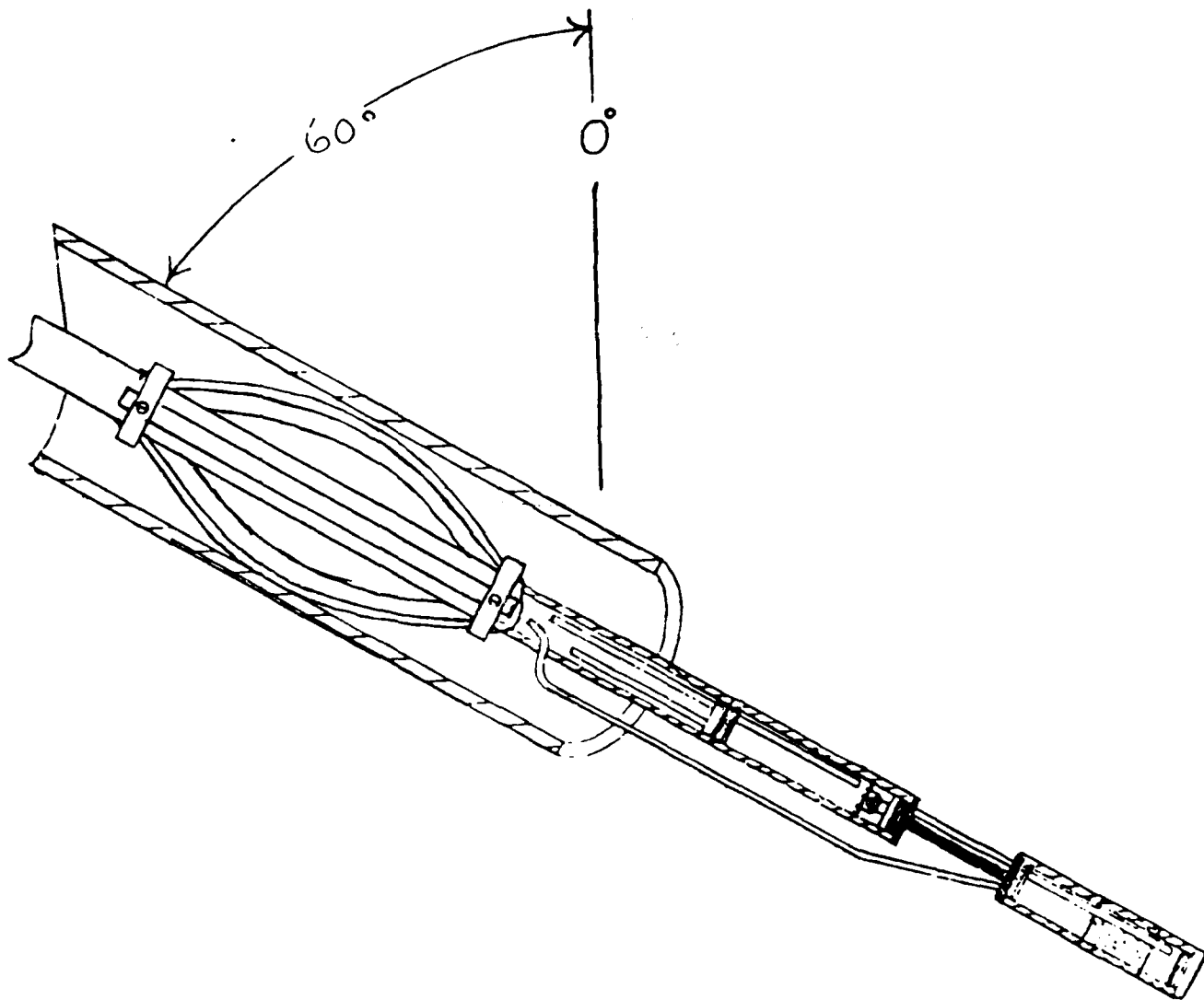
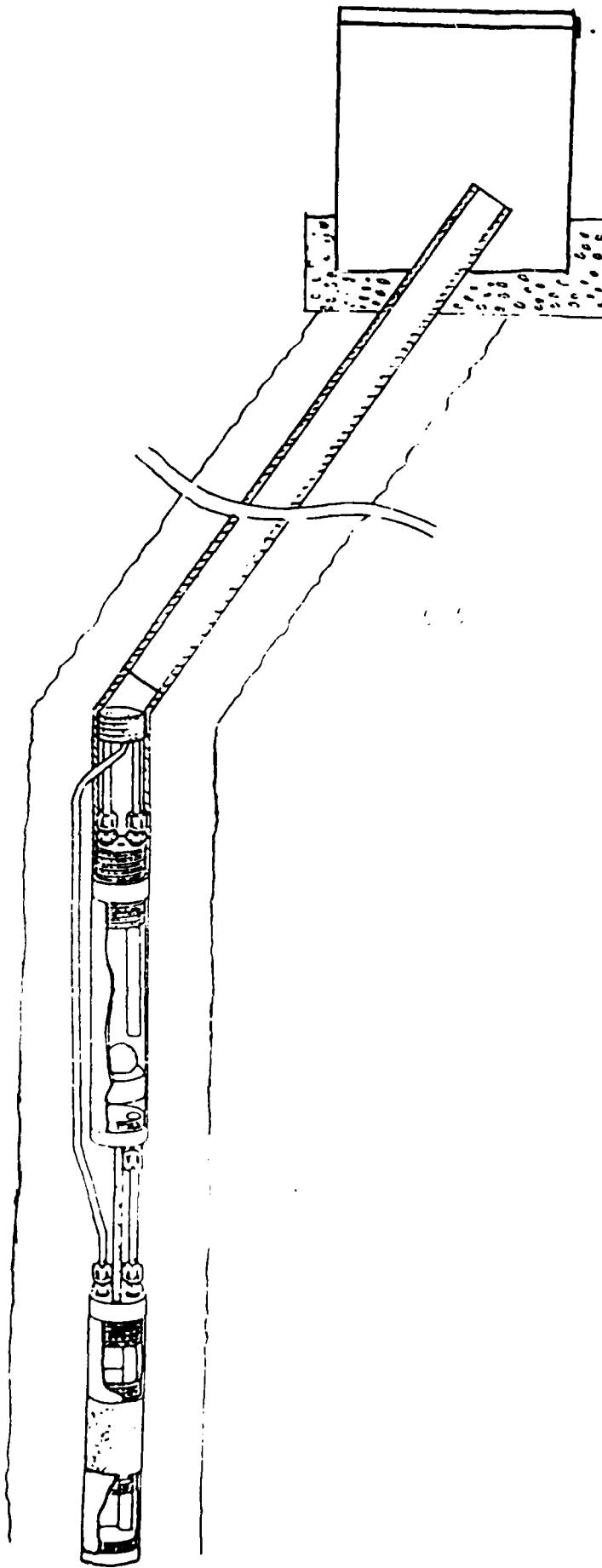


FIGURE #6



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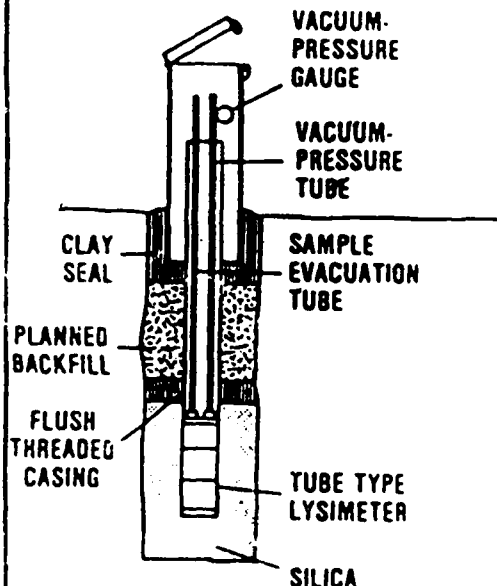
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INSTALLATION OF A TIMCO LYSIMETER



1. Check to make sure all joints and fittings on the lysimeter and tubes are tight. This can be easily ascertained by immersing the entire unit in distilled water and applying no more than 20 lbs. of air pressure. Observe all connections and joints for air bubbles except for the porous filter portion. The porous filter portion should give off bubbles over the entire surface. If any leaks are observed at any point other than the porous filter, the connections should be slightly tightened and checked again. If leaks are still observed, Teflon tape should be used on the threads and the unit re-assembled and checked. Also check for leaks at the plug, stop-cock, clamp, vacuum-pressure gauge or other devices to be used at the top of the tubes at the top of the borehole. It is recommended that prior to installation the lysimeter be submerged in distilled water and a vacuum of 15-20" HG. applied for about one hour. This procedure prewets all surfaces in the porous cup eliminating any entrained air in the porous media.

2. For a two inch diameter lysimeter, drill a six inch borehole or larger. It is recommended that as a minimum there be at least one and one-half inches on each side of the lysimeter for the silica pack. (If difficulties are encountered in maintaining an open borehole, use casing to hold back the material. After installation of the silica pack and lysimeter, pull back the casing and install a bentonite plug.)

3. Make a slurry of silica using a ratio of 150 ML. distilled water to 450 grams of 200 mesh silica flour; 50-60 lbs. of silica flour per lysimeter is suggested

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(2 gals. water to 50-60 lbs. silica flour). Care should be taken to blend water and silica completely, make certain that no "lumps" exist.

4. Pour part of the silica slurry into the borehole just prior to installation of the lysimeter. (Minimum of 1½ inches in the bottom for tube type, 4 inches for cup type).

5. Place the lysimeter into the borehole, with care being taken to ensure that the lysimeter is centrally located. A minimum of 1½ inches of silica pack around the annular area of the unit is essential. We suggest that the lysimeter be ordered with a threaded top plug which allows for use of TIMCO flush-threaded, deka-lok joint riser pipe with attached centralizers to ensure centering.

6. Pour the balance of the silica slurry around the lysimeter ensuring that the entire unit is completely covered. This will allow for any "settling" or slumping of the silica pack as moisture is withdrawn.

7. Place a bentonite seal above the silica pack followed by tamped backfill. A bentonite surface seal or other type of seal is also recommended. The best of course is a steel security cover with a lock, set in concrete.

8. Clamp off or plug sample evacuation tube. (If Teflon tubes are being used, use a Teflon plug or a Teflon stop-cock, as crimping will do damage to the tube.)

9. Using a vacuum-pressure hand pump or a portable vacuum pump, apply 18 to 21 inches of mercury. We recommend that a stop-cock be installed in the vacuum-pressure line at the surface as well as a vacuum-pressure gauge. If a gauge is not installed, there is no accurate way of determining the amount of initial vacuum or how much vacuum may be left at a later time. A stop-cock ensures no loss of vacuum as the pump is being disconnected, especially with the Teflon tubing, which, as previously mentioned may not be crimped or clamped off without damaging the tube.

10. When the vacuum-pressure gauge indicates less than 10 inches of mercury (approximately 24 hours) sample retrieval should be attempted.

11. **SAMPLE RETRIEVAL OF THE SHALLOW TYPE:** Using a sample flask that is more than adequate for the volume of the lysimeter with a two hole stopper at the top, insert and secure the sample or evacuation tube in one of the holes, making certain that the tube clears the bottom of the stopper by at

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least $\frac{1}{2}$ of an inch. Using another tube of adequate length, attach one end to the vacuum pump and insert the other end of the tube thru the other hole in the stopper (have tube flush with bottom of the stopper) and apply vacuum. Vacuum should be repeated until no further sample is obtained. Remove the tubes from the sample flask, repeat procedure numbers 8 thru 10. Discard from the first sample or SAMPLES, approximately 30% of the volume of the water used to mix the silica pack. Depending upon soil moisture and other factors, the second and subsequent samples may take up to 48 hours or longer to obtain a full sample. A vacuum reading of less than 10 inches will indicate that a sample should be taken. We suggest that the installation be checked every 24 hours.

12. SAMPLE RETRIEVAL UTILIZING THE TRANSFER VESSEL AT DEPTHS BELOW 20 FEET. Before installation of the lysimeter attach the transfer vessel 1'-2' above the lysimeter. Follow procedures 1 thru 10. Using a flask that is more than adequate for the volume of the lysimeter, insert and secure the sample or evacuation tube in a vented sample flask. Attach the gas or pressure tank to the vacuum-pressure tube attached to the lysimeter setting the pressure not to exceed $2\frac{1}{2}$ -5 lbs., forcing the sample into the transfer vessel. By using this amount of lbs. of pressure the lysimeter will not be overpressurized causing the silica pack to separate from the Teflon filter. Attach the gas or pressure tank to the second pressure tube which is attached to the transfer vessel. Set the pressure at about .42 lbs. per foot of depth. Apply pressure until all sample is obtained. Discard from the first sample or samples, approximately 30% of the volume of the water used to mix the silica pack. Depending upon soil moisture and other factors, the second and subsequent samples may take up to 48 hours or longer to obtain a full sample. A vacuum reading of less than 10 inches will indicate that a sample should be taken. We suggest that the installation be checked every 24 hours.

NOTE: We further recommend that a 99.5% pure silica be used in the silica pack. Chemical analysis of one-half of one percent impurities are available upon request. For critical installations, pure silica is available but is extremely expensive.

NOTE: During installation of PVC body Lysimeters only, we suggest filling the unit with distilled water to overcome the buoyancy factor. This allows the unit to be maintained in a central position within the borehole. Evacuate this water after the silica slurry has been in place for approximately 30 minutes.

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GENERAL INSTALLATION INFORMATION

There are essential basic principles of using lysimetry sampling in the vadose or unsaturated zones. Below I have listed several points that must be covered by anyone involved with this work. Reviewing these basic principles will help you understand the methods employed and the reasoning behind them.

1. Our installation procedures recommend disposing of approximately 30 percent of the initial water volume used in the Timco silica pack after installation. This was determined and predicated on the assumption that immediately after installation a vacuum would be applied and within 24 hours samples were to be taken. If several days pass, it will not be necessary to discard any of the sample for the following reason:

The Timco silica slurry is used to establish a continuum between the lysimeter and surrounding soil. As Timco silica is not soluble in water, it immediately begins separating itself from the distilled water. As this separation occurs the water migrates into the soil and establishes the continuity needed so that when vacuum is applied the tension is transmitted outward, thereby allowing enough force to break the surface tension of any water attached to soil particles. Samples collected should be considered representative of the area of investigation.

2. The next step involved will be to bring the sample to the surface for evaluation. If your installation requires the utilization of a lysimeter with a transfer vessel in tandem, (the distance separating the two units is approximately one foot.) Use .43 lbs. of pressure per foot of lift, this allows minimum use of pressure to bring the sample to the surface. Using these calculations one should use only enough pressure to retrieve the sample. Because a transfer vessel is designed for water transfer, some air will bleed by the transfer check valve and enter the lysimeter. This can cause a slight pressurization of the lysimeter and move untransferred water up the pressure vent tube. If the units are of 100% virgin teflon construction, any future samples will not have been altered and should also be considered representative of the area of investigation.

3. Finally, I would like to discuss the amount of sample retrieved from each unit. You would, and should not, expect all locations to have the same moisture content. Where moisture content is low, longer

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LYSIMETER PRODUCT BULLETIN

Timco produces four basic lysimeters to date, all designed for different applications. Our cup lysimeter, the design most people are familiar with, incorporates a bottom entry cup shaped filter. The tube lysimeter uses a tube type filter located midway up the lysimeter body with the bottom portion acting as a collection chamber. The disc lysimeter, with a top entry filter and single vacuum/evacuation line, is designed for shallow installations where it is desirable to obtain samples from the surface as in acid rain investigations. Our sleeve lysimeter works in conjunction with a monitoring well and allows monitoring of both the saturated and unsaturated zones with a single installation.

The threaded modular design of all the units allow for ease of handling, rapid field assembly, unit retrieval from deep installations and interchangeability of components.

The superior performance of fluoroplastics is well known and documented. Timco's porous fluoroplastic filter material exhibits many desirable qualities which make it a natural in lysimeter usage.

- 1) Porous fluoroplastic has an average pore size of 50 microns. Ceramic pore size averages around 1 to 3 microns. This large pore size enables larger molecules and compounds to pass without filter interference, without sacrificing its ability to maintain vacuum. Pore size can be adjusted to meet specific requirements.
- 2) Fluoroplastic is the most inert material available for lysimeter applications today. It will neither add to nor subtract from the collected sample.
- 3) Fluoroplastic remains unaffected by pH. Tests have shown that in an acidic condition, a ceramic filter will buffer from .3 to .5 points in a 24 hour period.
- 4) A porous fluoroplastic filter has a higher impact strength than ceramic. Rough handling typical of field installations should not be a concern with a fluoroplastic filter.
- 5) Even with its unique inner structure, a porous fluoroplastic lysimeter, when installed properly, will hold a vacuum as

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periods of sampling will be required. One suggestion we would like to make, and one that may help you accelerate your sampling time, would be the use of a vacuum bottle. Using this procedure allows for longer maintenance of higher vacuum times which could increase sample volumes. Once again, moisture content will be the limiting factor.

If additional information is needed, please do not hesitate to call me.

Robert Timmons
President

A diamond-shaped logo with a wavy line at the bottom. The text "TIMCO MFG." is written in a bold, sans-serif font across the center of the diamond.

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<u>DATE</u>	<u>TIME</u>	<u>VAC</u>	<u>PSI APPLIED</u>	<u>TIME</u>	<u>ML REC.</u>	<u>HT OF LIFT</u>
6-23	11:00P	0	30	30	345	25
			Added water at this point to insure water available for collection. 500 ML			
	11:30A	20	Reapplied vacuum			
	1:00P	20	Vac check only			
6-24	4:00P	0	35	8	98	25
	4:30P	20	Reapplied vac			
6-25	10:00A	0	25	14	130	25
	10:15A	20	Reapplied vac			
6-27	12:00P	0	35	22	349	25
	1:00P	20	Reapplied vac			
6-28	4:00P	0	35	4	40	25

Media drying out-terminate test.

FINAL DATA: Length of Test: 9 days
Total ML received: 1797 ML
Max. PSI: 35 PSI
Height of lift: 25 ft.

CONCLUSION: No pack failure. Lysimeter functioned well through entire test. A 35 PSI pressure is equivalent to a lift in excess of 60 ft.

It should be noted that easy and consistent pressure should be applied when evacuating lysimeters. Undue strain should be kept to a minimum.

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**TIMCO TECHNICAL SERVICES
EVALUATION REPORT**

EFFECT OF PRESSURE ON LYSIMETER SILICA PACK

PURPOSE: To evaluate the effect of various sample lift pressures on the silica pack.

PROCEDURE: A 1.5" I.D. tube type lysimeter was set in a visual chamber using sand as the soil medium and silica pack consisting of 30 lbs. of silica flour mixed with 4.5 liters of distilled water, as per standard Timco installation instructions. This installation was a shallow type, with the top of the unit at ground level. The evacuation line was attached to a 20 ft. pole which, with the lysimeter 5 ft. below, simulated a 25 ft. lift. A constant pressure source was used in order to achieve a uniform pressure and allow for timing of the lift.

CALCULATIONS: It should take approximately 11.25 psi to lift a sample 25 ft.

DATA:

<u>DATE</u>	<u>TIME</u>	<u>VAC</u>	<u>PSI APPLIED</u>	<u>TIME</u>	<u>ML REC.</u>	<u>HT. OF LIFT</u>
6-20	8:00	20 in hg.	Initial	Installation-No sample		
6-21	9:30	0	10	15		
6-20	8:00A	20 in hg.	Initial	Installation-No sample		
6-21	9:30A	0	10	15	0	
		Insufficient pressure to lift sample 25 ft.				
	9:35A	0	15	15	200	25
		Increase pressure after 15 seconds				
	9:40A	0	20	17	235	25
	9:45A	20	Reapplied vacuum			
	11:30A	20	Vac check only			
	3:30P	18	Vac check only			
	5:00P	14	Vac check only			
6-22	9:30A	0	25	27	400	25
		Added water at this point to insure water available for collection 500 ML.				
	10:00A	20	Reapplied vacuum			
	12:00P	20	Vac check only			
	2:00P	18	Vac check only			

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well as ceramic. Tests comparing Teflon and ceramic show Teflon vacuum retention is more consistent with greater sample amounts received overall.

- 6) All filters will eventually clog. The nature of fluoroplastic filters with their neutral polarity and large pore size help make these filters much less susceptible to clogging. Testing of samples with highly soluble iron contents show that a fluoroplastic filter allowed approximately 26% more iron to pass than the ceramic.
- 7) The design and pore size of the fluoroplastic filter allow for larger sample collection. Tests have shown that for a given period of time under identical moisture conditions, the fluoroplastic collected an average of 18% more sample. Also, and more importantly, the fluoroplastic unit will collect samples in low moisture conditions where the ceramic will not. In pure sand with a moisture content of .6% and a soil suction of 18 centibars, the fluoroplastic lysimeter collected a 20 ml sample after a 24 hour period. The ceramic failed to collect a sample at 1.03% moisture, or 12 centibars of soil suction in the same media.
- 8) Timco recommends the use of a silica pack for all installations of all lysimeters. Since pure silica is extremely expensive, a 99.88% pure grade is recommended. Impurities do exist. In acidic conditions of 0 to 4.0 pH, the silica will buffer the sample from .9 to .3 points. However, data on amounts of sample required to pass through the silica to cessation of buffering have been gathered and graphed. By using this data it is possible to calculate the amount of sample required to pass through the pack before the sample is truly representative, or to know at any specific volume what the actual pH of the sample is.

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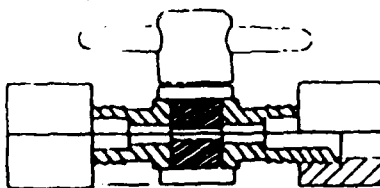
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Teflon[®] Stopcock



Injection molded of chemically inert Teflon[®] PFA, the stopcock has a one piece handle and stem construction.

The stopcock has a quarter turn open-close position with a straight-through orifice.

There are no metal or other plastic parts which could corrode in caustic environments.

Teflon[®] TFE Tubing

Available in $\frac{1}{4}$ " O.D. x $\frac{1}{8}$ " I.D. in continuous lengths. It is chemically inert, even to the most exotic solvents. Cut and pre-grooved for use with Teflon[®] fittings.

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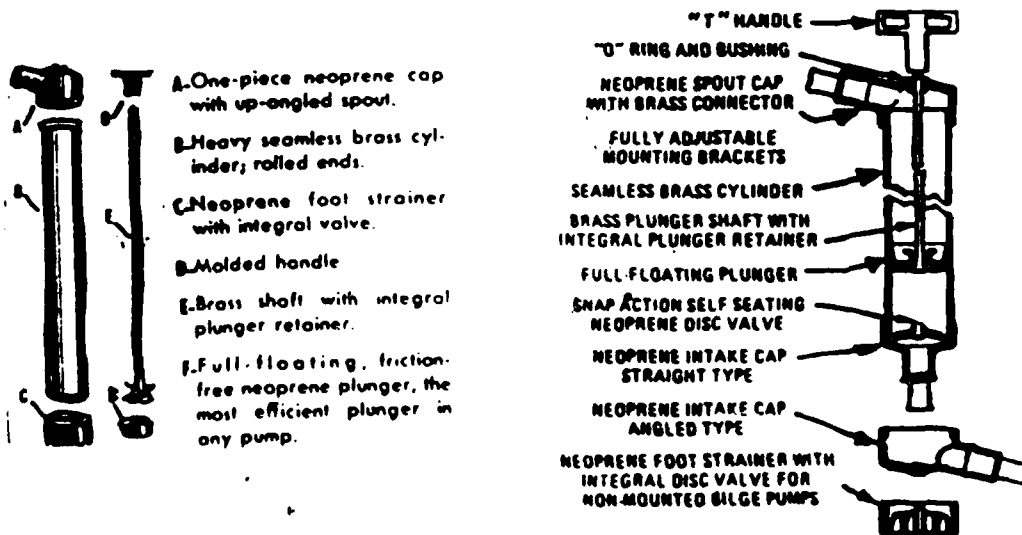
PAR™ UTILITY HAND PUMPS

General Information

PAR pumps never need coaxing or priming, full suction on the first stroke. Brass cylinders, high-quality oil resistant plungers, intake and discharge caps for the long life. Pumps can be used in any position. Available in 1-1/4" diameter cylinders.

Specifications

MODEL	STROKES PER GAL.	CYL. DIA.	STROKE LENGTH	OVERALL LENGTH	HOSE CONNECTION	WEIGHT
33799-0000	26	1-1/4"	7-1/2"	12"	1/2"	2.0



Maintenance

To disassemble pump for cleaning and repair, pull handle out approximately 4" and place screwdriver carefully under bottom of spout cap and over outside of cylinder roll. Lift up on screwdriver and pry off spout cap. Pull out plunger shaft



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assembly. Lift full floating plunger off seat and clean between cup and seat. Remove intake cap in same way as spout cap. Take disc valve from cylinder and clean under neoprene flapper. Run rag through cylinder for cleaning.

To reassemble pump place disc valve in cylinder, snap intake cap back onto cylinder being sure undercut in cap is over cylinder roll. Insert plunger shaft assembly into cylinder and snap spout cap over cylinder roll.

Oil pump internally and spray with corrosion inhibitor or light oil for storage.



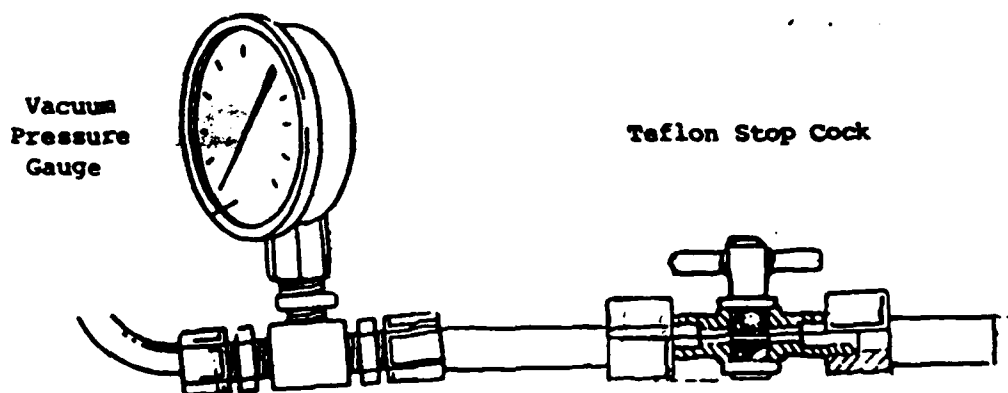
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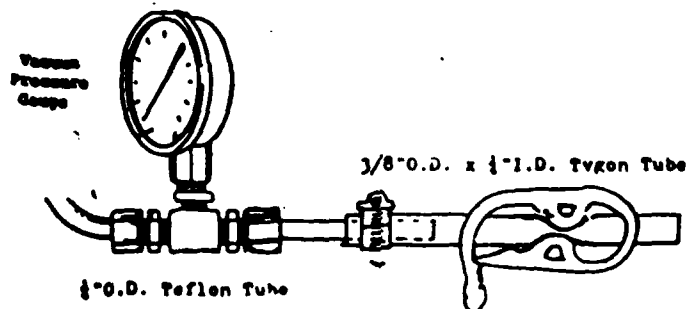
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For lysimeter installations, the Vacuum-Pressure gauge is adapted to a teflon T fitting which is attached to the teflon $\frac{1}{4}$ " O.D. tube. The teflon tube is cut and grooved with a groover to allow the fittings to tighten properly so the tube does not slip out. At this point a teflon stop-cock is installed.

All fittings should be tightened with a wrench.

While it is desirable to attach a teflon stop-cock at the end of the tube as mentioned above, shown below as a cost effective option. A piece of $\frac{3}{8}$ " O.D. x $\frac{1}{4}$ " I.D. tygon tube is placed over the teflon tube with a steel base clamp holding it in place. The end of the tygon tube is sealed off with a plastic gripping clamp.



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TIMCO TECHNICAL SERVICES

EFFECT OF SILICA PACK ON LYSIMETER SAMPLE pH

PURPOSE: To evaluate the extent that a silica slurry used as a pack material for lysimeter installations will act as a buffering agent in acidic soil conditions.

INTRODUCTION: Timco has always recommended the use of a silica pack in the installation of all lysimeters. A properly installed pack ensures a consistent bridge between the filter media and the soil. This is especially helpful in soil conditions where grain size varies. It also helps eliminate the problem of soil clogging the filter over time.

This procedure involves placing a slurry of silica flour and distilled water around the filter area at a ratio of 1 lb. silica to 150 ml of water. Since the cost factor of pure silica is prohibitive, a 99.98% pure silica is commonly used. This grade, however, does contain a small amount of impurities which could slightly affect the pH of an acidic sample passing through it. In some cases, this slight buffering action could be an area of concern.

AREA OF INVESTIGATION: In this test we attempted to calculate the severity of the buffering action using various solutions of known pH in order to:

- 1) Enable the user to calculate how much solution must pass through the silica pack before buffering action is complete.
- 2) Predict at any given sample amount the extent of current buffering action.

The only constraints on this evaluation are:

- 1) The silica flour used was that available from Timco Mfg., Inc.
- 2) Filters used are Timco's rigid porous fluoroplastic which do not themselves affect pH.

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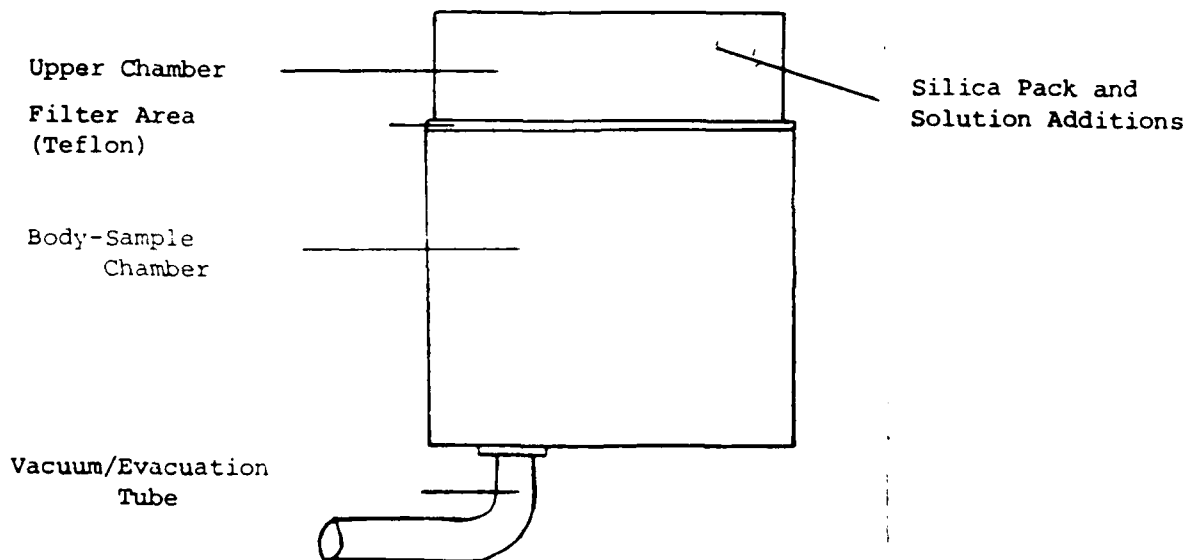
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PROCEDURES: A modified Timco disc type lysimeter was used for this evaluation. The disc lysimeter is of top entry design, made entirely of fluoroplastic. A 2" high collar was fabricated to thread on the top portion of the unit against the filter, creating a chamber for the silica pack to adhere to the filter. Solution additions were also made to the lysimeter via this upper chamber. (See figure 1).

Figure 1
Modified Disc Lysimeter



Five different pH solutions were run; 2.4, 3.8, 4.5, 5.7, and 7.0. Each was passed through 45 g of silica flour mixed with 15 ml of distilled water. A vacuum of 15 inches of Hg. was applied to pull the sample. The initial 15 ml of solution received was discarded, and each subsequent sample was checked for pH and volume noted. Each test ran until at least two consecutive samples yielded the initial pH reading of that test solution.

Between each test, the lysimeter, filter, tubing and all other equipment involved in the test were washed with distilled water to prevent contamination.

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DATA: Each pH solution was passed through the silica material as previously described. Amounts received and their pH are noted in Figure 2, below.

Test Solution pH	Sample 1 Amt. pH	Sample 2 Amt. pH	Sample 3 Amt. pH	Sample 4 Amt. pH
2.4	4 ml 3.3	5 ml 3.0	4 ml 2.9	9 ml 2.8
3.8	5 ml 4.3	4 ml 4.1	8 ml 4.0	8 ml 3.8
4.5	12 ml 4.6	9 ml 4.5	----	----
5.7	4 ml 5.8	7 ml 5.7	----	----
7.0	10 ml 7.0	----	----	----

Test Solution pH	Sample 5 Amt. pH	Sample 6 Amt. pH	Total ML	Max. Variance
2.4	9 ml 2.5	6 ml 2.4	37	.9
3.8	----	----	25	.5
4.5	----	----	21	.1
5.7	----	----	11	.1
7.0	----	----	---	---

In addition, after each test was completed, the silica pack material was mixed with an additional 50 ml of corresponding solution. This solution was allowed to set overnight and the pH checked the following morning. In each case, the pH matched the initial pH of the solution. This supports the conclusion that the buffering action was indeed completed.

GRAPH OF RESULTS: By expanding the results 10x and plotting it as solution pH change vs. amount of solution through the pack a definite pattern is apparent. The cessation of buffering appears as a straight line. The maximum amount of solution needed to complete buffering can now be calculated for various pH and various amounts of silica pack material. It can also be predicted what the actual pH of a given unknown solution is by observing the intersection of that point and total solution received at that time.

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—SAMPLERS
—LYSIMETERS

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851 FIFTEENTH STREET
PRAIRIE DU SAC, WISCONSIN
53578

—PVC SAND POINTS
—PVC WELL SCREENS
—SCREENS FOR DEWATERING

Telex # 9109970034
Area Code 608-643-8534

INTERPRETATION OF LAB RESULTS: Laboratory examination has yielded the most extreme results from the most extreme conditions possible. In actual field installations, a "conversion factor" can be used to calculate the closest approximation of total solution needed to complete buffering. This calculation is viable due to two field conditions not found in the laboratory.

First, due to its construction and the action of in situ soil tension, a lysimete does not draw samples through the entire silica pack. The immediate area directly opposite and just above and/or below the filter are the only areas through which moisture will pass. Consequently, in a normal installation, only about 50% of the installed silica pack will be in contact with the obtained sample.

Second, it is not necessary to discard an entire sample volume equal to the amount of water used in the pack installation. Factors relating to soil tension will draw water from the pack both outward and downward and dispense it well through the immediate soil area and beyond. In a normal installation under normal conditions, an amount equal to 30% of the volume of initial pack moisture should be discarded before a representative sample can be assumed.

CALCULATIONS: With the information from the graph and amounts from an installation, use the following as an example.

Amount of silica used: 35 lbs.
Amount of water used: 5250 ML (150 ML/lb.)
Approximate pH of moisture in soil: 2.4

To calculate approximate solution needed to pass to cessation of buffering,

Water used in pack x 30% + amount of solution for pH from graph x actual amount of silica x 50%

=5250 ML x 30% + 375 ML x 35 lbs. x 50%
=1575 ML + 6562 ML
=8137 ML
=8.137 L
=2.14 gallons to cessation of buffering for 2.4 pH.

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Also note that even in the most severe case of buffering the variance in pH was .9 points. In many cases, the effect of buffering may not even be of great concern.

BY: 

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—COMPLETE MONITORING LINE
—SAMPLERS
—LYSIMETERS

TIMCO MFG., INC.

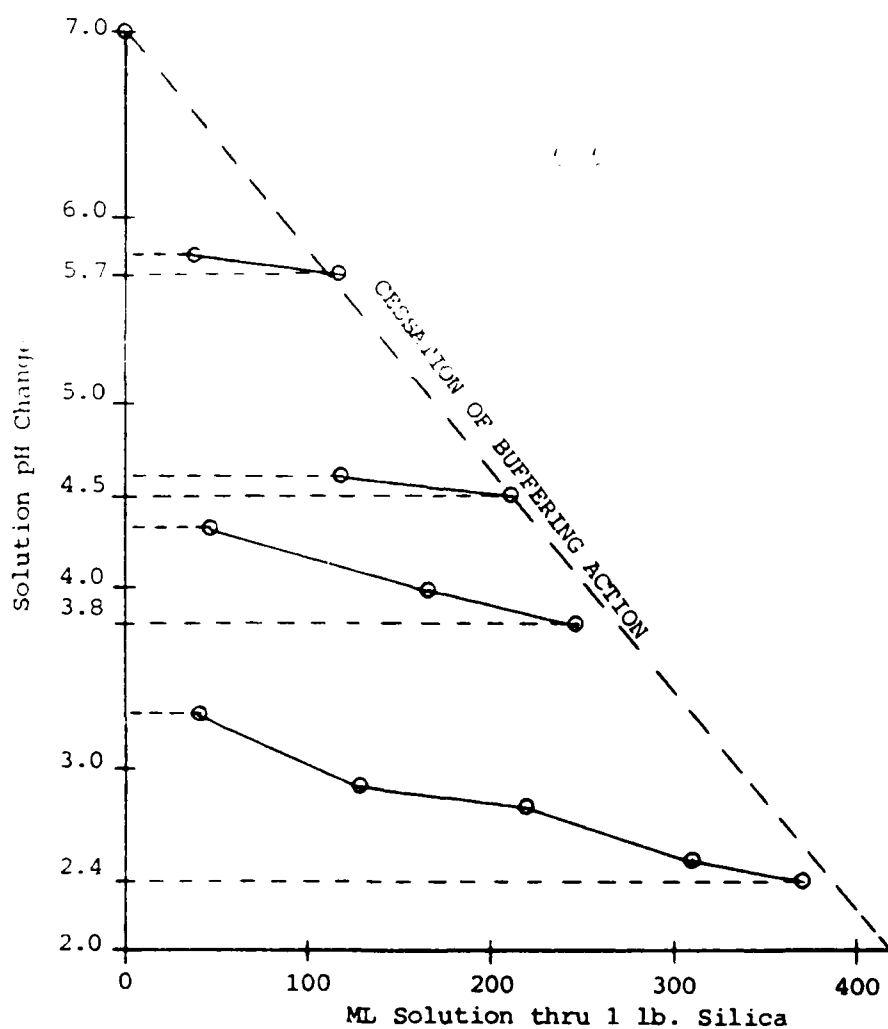
851 FIFTEENTH STREET
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GRAPH I

SILICA BUFFERING ACTION
(Graphics 10X of actual data.)



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—PVC SAND POINTS
—PVC WELL SCREENS
—SCREENS FOR DEWATERING

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LYSIMETER PRODUCT BULLETIN

Timco produces four basic lysimeters to date, all designed for different applications. Our cup lysimeter, the design most people are familiar with, incorporates a bottom entry cup shaped filter. The tube lysimeter uses a tube type filter located midway up the lysimeter body with the bottom portion acting as a collection chamber. The disc lysimeter, with a top entry filter and single vacuum/evacuation line, is designed for shallow installations where it is desirable to obtain samples from the surface as in acid rain investigations. Our sleeve lysimeter works in conjunction with a monitoring well and allows monitoring of both the saturated and unsaturated zones with a single installation.

The threaded modular design of all the units allow for ease of handling, rapid field assembly, unit retrieval from deep installations and interchangeability of components.

The superior performance of fluoroplastics is well known and documented. Timco's porous fluoroplastic filter material exhibits many desirable qualities which make it a natural in lysimeter usage.

- 1) Porous fluoroplastic has an average pore size of 50 microns. Ceramic pore size averages around 1 to 3 microns. This large pore size enables larger molecules and compounds to pass without filter interference, without sacrificing its ability to maintain vacuum. Pore size can be adjusted to meet specific requirements.
- 2) Fluoroplastic is the most inert material available for lysimeter applications today. It will neither add to nor subtract from the collected sample.
- 3) Fluoroplastic remains unaffected by pH. Tests have shown that in an acidic condition, a ceramic filter will buffer from .3 to .5 points in a 24 hour period.
- 4) A porous fluoroplastic filter has a higher impact strength than ceramic. Rough handling typical of field installations should not be a concern with a fluoroplastic filter.
- 5) Even with its unique inner structure, a porous fluoroplastic lysimeter, when installed properly, will hold a vacuum as

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—SAMPLERS
—LYSIMETERS

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53578

—PVC SAND POINTS
—PVC WELL SCREENS
—SCREENS FOR DEWATERING

Telex # 9109970034
Area Code 608-643-8534

well as ceramic. Tests comparing Teflon and ceramic show Teflon vacuum retention is more consistent with greater sample amounts received overall.

- 6) All filters will eventually clog. The nature of fluoroplastic filters with their neutral polarity and large pore size help make these filters much less susceptible to clogging. Testing of samples with highly soluble iron contents show that a fluoroplastic filter allowed approximately 26% more iron to pass than the ceramic.
- 7) The design and pore size of the fluoroplastic filter allow for larger sample collection. Tests have shown that for a given period of time under identical moisture conditions, the fluoroplastic collected an average of 18% more sample. Also, and more importantly, the fluoroplastic unit will collect samples in low moisture conditions where the ceramic will not. In pure sand with a moisture content of .6% and a soil suction of 18 centibars, the fluoroplastic lysimeter collected a 20 ml sample after a 24 hour period. The ceramic failed to collect a sample at 1.03% moisture, or 12 centibars of soil suction in the same media.
- 8) Timco recommends the use of a silica pack for all installations of all lysimeters. Since pure silica is extremely expensive, a 99.88% pure grade is recommended. Impurities do exist. In acidic conditions of 0 to 4.0 pH, the silica will buffer the sample from .9 to .3 points. However, data on amounts of sample required to pass through the silica to cessation of buffering have been gathered and graphed. By using this data it is possible to calculate the amount of sample required to pass through the pack before the sample is truly representative, or to know at any specific volume what the actual pH of the sample is.

TIMCO MFG.

TIMCO™

THE PRESIDENT'S MESSAGE

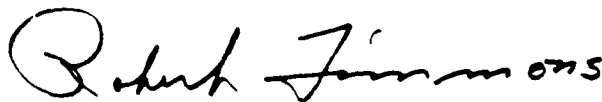
It has been our privilege to serve you with products manufactured by Timco™.

Timco Mfg., Inc. began production in 1970 because of my dissatisfaction with the quality of the well screens being manufactured. It was obvious there was a need for superior well screens and associated geotechnical products and I decided to devote all my time and energies to the design and manufacture of these products.

As the demand for our products grew, Timco™ expanded and in 1977 we built a new plant in Prairie du Sac, Wisconsin. Recently, we also purchased another building in the area to manufacture our new line of polytetrafluoroethylene products. These facilities allow for continuous flow production and expansion of Timco™ products and materials.

We continue to apply the highest quality control standards to our manufacturing process and the materials we use. Sales of our PVC well screens and related products reflect our determination that quality and integrity must not be compromised. Even though we are growing, we will continue to conduct our business as it began - as a service to our customers and friends.

If you have problems or questions on special applications, call us. My staff and I will always be available to you, the TIMCO™ customer.



Robert Timmons
President

TIMCO™ APPLICATIONS

- Oil spill monitoring
- Water quality observation
- Sanitary landfill leachate control
- Water sampling
- Hydrology drawdown testing
- Dewatering control
- Foundation surcharge design
- Construction site control
- Long term fluctuations in site studies
- Test borings and subsurface investigations
- In situ leaching-bore hole mining
- Slurry wall and pressure grout monitoring
- Irrigation and sprinkler systems

PVC & PTFE PRODUCTS OFFER THE FOLLOWING ADVANTAGES

- Light weight
- No line purging
- Easy to install
- Longest well life
- Nontoxic
- Abrasion resistant
- Dimensional stability
- Impact strength
- Weather resistant
- Low cost
- Chemically inert
- Corrosion resistant
- Reduced possibility of plugging
- Nonwetting interior surface
- No taste or odor
- No pick up of algae or scale
- No electrolytic attack
- Excellent dielectric properties

Published by Timco Mfg., Inc.
851 Fifteenth Street, Prairie du Sac, Wisconsin 53578

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Timco Mfg., Inc. P.O. Box 8 851 Fifteenth St. Prairie du Sac, WI 53578 (608)643-8534



TIMCO™ Lysimeters

Vacuum Pressure Lysimeter (Tube Type)

TIMCO™ TUBE TYPE VACUUM PRESSURE LYSIMETER is designed to retrieve a sample from an unsaturated zone at depths up to 20 feet

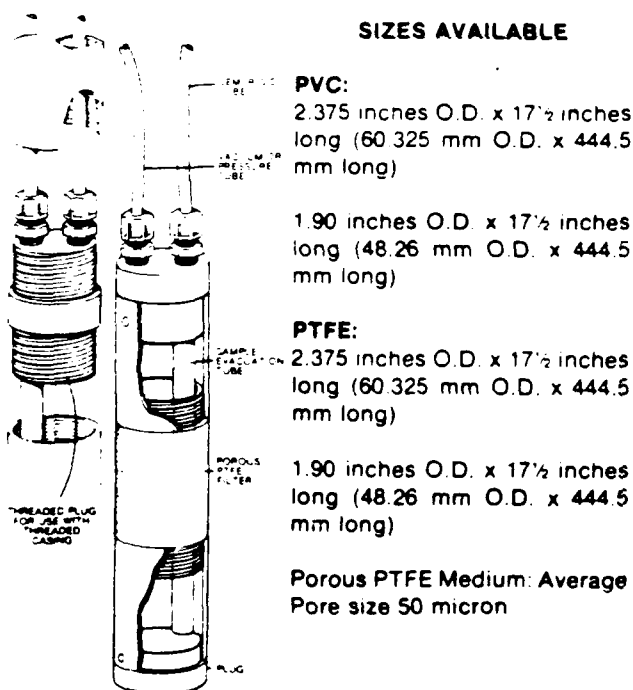
All threaded construction for ease of decontamination

Available in polyvinyl chloride (PVC) or polytetrafluoroethylene (PTFE) body

Porous medium is virgin PTFE

1/4 inch O.D. Tygon or 1/4 inch O.D. PTFE tubing is available with all TIMCO™ Lysimeters.

For setting depths below 20 feet, install a TIMCO™ Transfer Vessel at a maximum of 5 feet above the Vacuum Pressure Lysimeter. This allows the sample to be brought to the surface without over pressurizing the lysimeter. See page 13.



Bottom Entry Vacuum Pressure Lysimeter (Cup Type)

BOTTOM ENTRY CUP TYPE VACUUM PRESSURE LYSIMETER is designed to retrieve a sample from an unsaturated zone at depths up to 20 feet

All threaded construction for ease of decontamination

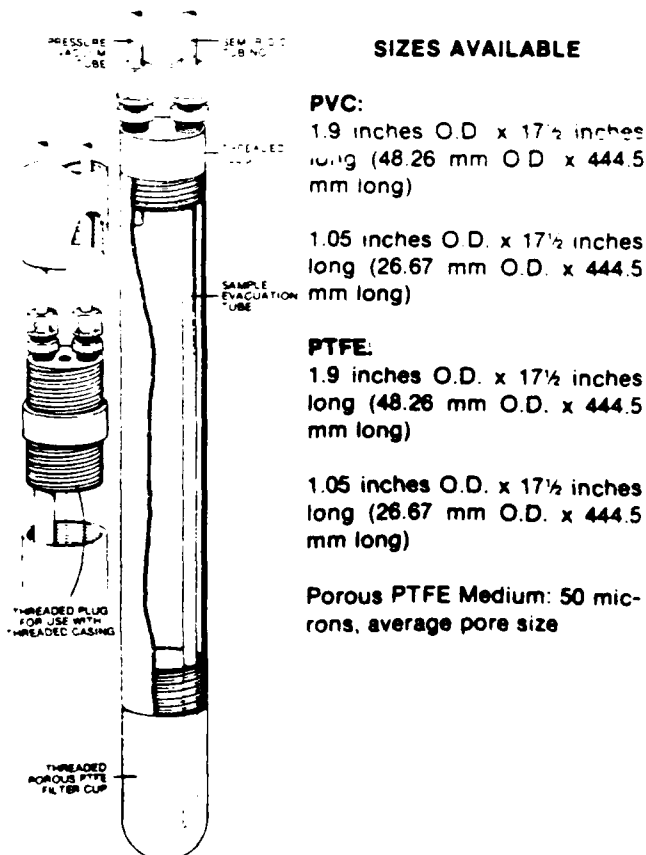
Available in all polyvinyl chloride (PVC) or all polytetrafluoroethylene (PTFE)

Porous Medium is all virgin PTFE

1/4 inch O.D. Tygon or 1/4 inch O.D. PTFE tubing is available with all TIMCO™ Lysimeters.

For setting depths below 20 feet, install a TIMCO™ Transfer Vessel at a maximum of 5 feet above the Vacuum Pressure Lysimeter. This allows the sample to be brought to the surface without over pressurizing the lysimeter. See page 13.

Filter media is virgin PTFE



Timco Mfg., Inc.

P.O. Box 8

851 Fifteenth St.

Prairie du Sac, WI 53578

(608)643-8534

Sleeve Lysimeter

SLEEVE LYSIMETER is designed to be an integral part of a monitoring well. This permits sampling of the saturated and unsaturated zones. Only one borehole is required, therefore, reducing time and costs. The sleeve lysimeter is threaded to the TIMCO™ flush threaded screen and casing.

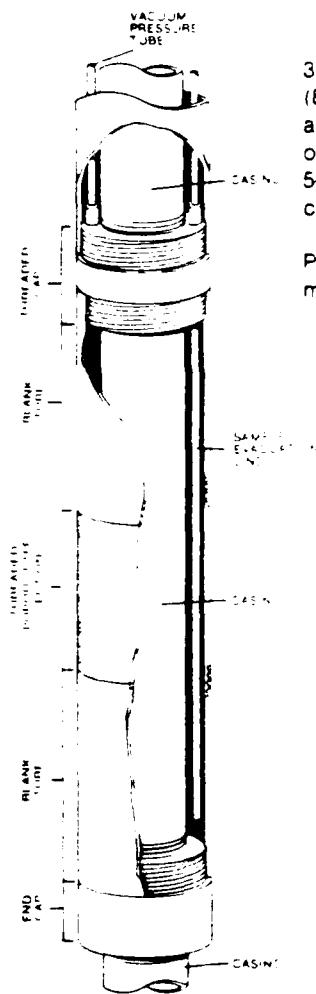
Threaded materials constructed of polyvinyl chloride or all virgin polytetrafluorethylene (PTFE)

Porous Medium is all virgin PTFE

SIZES AVAILABLE

3.5 inches O.D. x 24 inches long
(88.9 mm O.D. x 609.6 mm long)
accommodates 1½ inches I.D.
or 2 inches I.D. (38.1 mm I.D. or
50.8 mm I.D.) flush threaded
casing

Porous PTFE Medium: 50
microns average pore size



Casing Lysimeter

CASING LYSIMETER is designed to retrieve samples from various depths in the unsaturated zone utilizing one borehole.

No epoxy or solvent cements used in construction

Complete threaded construction for ease of assembly and disassembly

Exterior all flush threaded for ease of installation

Interchangeable with PTFE, PVC and Stainless Steel flush threaded casing

Body components available in PTFE or PVC

Filter media is virgin PTFE

SIZES AVAILABLE

PVC:

2.375 inches O.D. x 27 inches long
(60.325 mm O.D. x 685.8 mm long)

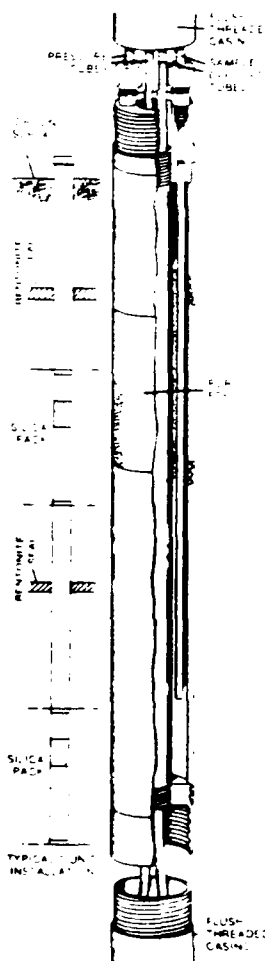
3.50 inches O.D. x 27 inches long
(88.9 mm O.D. x 685.8 mm long)

PTFE:

2.375 inches O.D. x 27 inches long
(60.325 mm O.D. x 685.8 mm long)

3.50 inches O.D. x 27 inches long
(88.9 mm O.D. x 685.8 mm long)

Porous PTFE Medium: 50 microns, average pore size



APPENDIX I-E
FIELD SURVEYING DATA



FORSGREN•PERKINS ENGINEERING

OWNER-PROJECT	E/A SCIENCE	BY	DJF	DATE	2-13-87	PROJECT NO.	863110
FEATURE	TAD - WELL SITES	CHK'D BY		DATE		SHEET	1 OF 2

- NORTH AREA -

USGS

"SOUTH"

LAMBERT PCGP

X ? 4,302.00000

Y ? 1,734,611.310

LAT. = 777,981.360

LONG. = 40.00000

27.00000

55.35140

MAP ANGLE = 0.00

-36.00

-39.55

SCALE FACT. = 0.9999593

F/P 104

LAMBERT PCGP

X ? 4,302.00000

Y ? 1,750,219.410

LAT. = 791,979.150

LONG. = 40.00000

30.00000

15.26764

MAP ANGLE = 0.00

-34.00

-31.36

SCALE FACT. = 0.9999670

N 3F

LAMBERT PCGP

X ? 4,302.00000

Y ? 1,750,364.510

LAT. = 792,976.810

LONG. = 40.00000

30.00000

25.14040

MAP ANGLE = 0.00

-34.00

-30.24

SCALE FACT. = 0.9999676

N 3H

LAMBERT PCGP

X ? 4,302.00000

Y ? 1,750,370.100

LAT. = 792,990.030

LONG. = 40.00000

30.00000

25.27157

MAP ANGLE = 0.00

-34.00

-30.20

SCALE FACT. = 0.9999676

N 3E

LAMBERT PCGP

X ? 4,302.00000

Y ? 1,750,336.750

LAT. = 792,653.090

LONG. = 40.00000

30.00000

21.93876

MAP ANGLE = 0.00

-34.00

-30.45

SCALE FACT. = 0.9999674

N 301

LAMBERT PCGP

X ? 4,302.00000

Y ? 1,750,312.790

LAT. = 792,373.120

LONG. = 40.00000

30.00000

19.16996

MAP ANGLE = 0.00

-34.00

-30.62

SCALE FACT. = 0.9999672



FORSGREN•PERKINS ENGINEERING

OWNER-PROJECT

BY

DATE

PROJECT NO.

FEATURE

CHK'D BY

DATE

SHEET 2 OF

N 302

LAMBERT PCGP

4,302.000000

X ?

1,750,339.170

Y ?

792,372.240

LAT. =

40.00000

30.00000

19.16301

LONG. =

112.00000

23.00000

52.00100

MAP ANGLE =

0.00

-34.00

-30.40

SCALE FACT. =

0.9999672

N 3A

LAMBERT PCGP

4,302.000000

X ?

1,750,638.930

Y ?

792,717.460

LAT. =

40.00000

30.00000

22.60403

LONG. =

112.00000

23.00000

48.24600

MAP ANGLE =

0.00

-34.00

-27.95

SCALE FACT. =

0.9999674

N 3C

LAMBERT PCGP

4,302.000000

X ?

1,750,926.140

Y ?

792,006.380

LAT. =

40.00000

30.00000

16.39724

LONG. =

112.00000

23.00000

44.44620

MAP ANGLE =

0.00

-34.00

-25.51

SCALE FACT. =

0.9999671

N 3I

LAMBERT PCGP

4,302.000000

X ?

1,750,610.000

Y ?

793,045.060

LAT. =

40.00000

30.00000

25.83910

LONG. =

112.00000

23.00000

40.65200

MAP ANGLE =

0.00

-34.00

-26.21

SCALE FACT. =

0.9999676

N 3B

LAMBERT PCGP

4,302.000000

X ?

1,750,648.420

Y ?

792,714.800

LAT. =

40.00000

30.00000

22.57952

LONG. =

112.00000

23.00000

48.12200

MAP ANGLE =

0.00

-34.00

-27.87

SCALE FACT. =

0.9999674

Received 2/23/87 LKM



FORSGREN PERKINS ENGINEERING

OWNER-PROJECT Tooele Army Depot Wells	BY	DATE	PROJECT NO.
FEATURE Cuts	CHK'D BY	DATE	SHEET OF

MORGAN

LAMBERT EIDF

$X = 302.000000$
 $Y = 1740.486.800$
 $752.574.700$
 LAT. =
 40.00000
 03.00000
 44.98275
 LONG. =
 112.00000
 25.00000
 54.25355
 MAP ANGLE =
 0.00
 -36.00
 -40.55
 SCALE FACT. =
 0.9999530

SOUTH

LAMBERT EIDF

$4.302.000000$
 $X = 1.734.611.312$
 $Y = 777.981.364$
 LAT. =
 40.00000
 27.00000
 55.35151
 LONG. =
 112.00000
 27.00000
 13.69116
 MAP ANGLE =
 0.00
 -36.00
 -39.55
 SCALE FACT. =
 0.9999530

INVERSE FOR BASIS
OF AZIMUTH

GRID AZ = $346^{\circ} 58' 44''$

GRID DIST. = 26,077.19'

AV. SCALE FACTOR = 0.9999530

GROUND DIST. = 26,078. ~~15~~ 42'

INDEX

PAGE	DESCRIPTION
1-3	HORIZONTAL CONTROL - NORTH AREA
4-10	VERTICAL CONTROL - NORTH AREA
11	SUMMARY OF HORIZ. AND VERT CONTROL
12	HORIZONTAL CONTROL SOUTH AREA

STA	DIRECT	REVERSE	Horizontal Distance	Vertical Distance	Remarks
BASE CONTROL	100.00	100.00	50.00		North Area Herz Center 5/4/80 BRASS CAGE IN CORNER C. 10.00
BS 100	100.00	100.00	50.00		SET PLANE TO 100.00
CONTROL	100.00	100.00	50.00		SET PLANE TO 100.00
FS PT 101	100.00	100.00	50.00		SET PLANE TO 100.00
BS 100	100.00	100.00	50.00		SET PLANE TO 100.00
CONTROL	100.00	100.00	50.00		SET PLANE TO 100.00
FS PT 102	100.00	100.00	50.00		SET PLANE TO 100.00
BS PT 101	100.00	100.00	50.00		SET PLANE TO 100.00
CONTROL	100.00	100.00	50.00		SET PLANE TO 100.00
FS PT 103	100.00	100.00	50.00		SET PLANE TO 100.00
BS PT 102	100.00	100.00	50.00		SET PLANE TO 100.00
CONTROL	100.00	100.00	50.00		SET PLANE TO 100.00
FS PT 104	100.00	100.00	50.00		SET PLANE TO 100.00

3/4/60

STA	DIRECT	REVERSE	HORIZ DISTANCE	SECTION
CONTROL BS PT 103	00-00-00	179 59 54	1314	
CONTROL XO PT 104				
CONTROL FS PT 105	20 01 00	219 00 00	10710	51 421
CONTROL BS 104	00-00-00	179 59 54		
CONTROL XO PT 105				
CONTROL FS PT 106	172-50	00 58 28	10710	51 225
CONTROL BS 105	00-00-00	179 59 54		
CONTROL XO PT 106				
BASE FS CONTROL	120 58 28	219 00 00	10710	51 225
CONTROL BS PT 107	00-00-00	179 59 54		
BASE XO CONTROL				
CONTROL FS PT 108	1-03-45	179 59 54	10710	51 225

LA PT 104 CONTROL BS 105

LA PT 105 CONTROL BS 106

BASE CONTROL BS 107

CHECK FILE TRANSFER PAGE 10

DIRECT
PAGE 4

HARRIS D. ...

8/11/1940

FS CONTROL

19 59 40

1940

FERRY CAP ...

FERRY CONTROL

19 59 40

1940

FERRY CAP 104000 20000

FS PT 101

12 24 30
113-24-23

542

1940

FERRY CAP

FERRY

19 59 40

1940

FERRY CAP 104000 20000

FS CONTROL

1940

FERRY

FS PT 102

12 24 30
301-08-15

12 24 30

1940

FERRY CAP 104000 20000

NOTE: SEE PG 10 FERRY SKETCH

TRAVERSE CLOSED

PRECISION = 1/207,147

ACCEPTABLE

TOTAL DIST TRAVERSED = 31,072.41

ERROR = 0.15

NOTE: ONE SURVEYING INSTRUMENT ON FERRY CAP 104000
 BY THE US ARMY SURVEY THAT GAVE A FERRY CAP
 MARKER. FERRY CAP SURVEYING OUR SURVEY 1 (1940)
 WITH FERRY CAP SURVEYING MARKER AND A
 RESULT, I WENT INTO THE CLOSEST FERRY CAP
 TO OUR SURVEY 1 (1940) CASE OF BLINDS
 THESE MARKER WERE ESTABLISHED
 AROUND 1942

8/5/66
 G. L. RAY
 G. HEFF

VERTICAL CURVATURE

FL:V

FL:W

14"

21"

FL:W

4"

16"

14"

13"

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POSTAL
 BC CENTRE

24"

25"

26"

27"

28"

29"

FL:W

TP

TP

TP

INDUOUS SLEW W

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100A

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100B

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100A

100A

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11-13

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1851

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H₂ - 17 A. 1

WILL N. JONES

WELL N-3E

WELL 11-502

WEL. N. 34

WEST N 34

WFLN 31

שאלה 11 מ-2017:

WELN 17.3A

8/25/80

DATA

H₁

+

DATA

TP

100

DATA

100

24.5

TP

100

DATA

100

46.75

well N 40

100

DATA

TP

270

100

DATA

47

40

well N 40

250

DATA

couple 100

ACCU

NOTE ALL TUBING CELLS MUST BE
PVC PIPE INSIDE INSTALLED
WELL N-30 COULD NOT BE
RUN BASED OFF TUBING

STA	DIRECT	REVERSE	PC	NC	AREA	DATE
CP BS 104	00-00-00	171-24-10			NORTH AREA	11/17/96
CP AC 105					REAR ON BEACH WALL	12/05/97
FS SOUTH	125-45-00	205-41-15			PK. NAIL BLAST END FULFILLING RD.	T. SAHIL
SET II	00-00-00	119-54-10				
	125-45-00	205-44-50				
SET III	00-00-00	119-54-10				
	125-45-00	205-44-15				
CP BS 105	00-00-00	171-24-15				
CP BS 104						
FS SOUTH	317-26-20	137-25-20			VEGET. ON SOUTH MOUNTAIN	
SET I	00-00-00	119-54-18				
	317-26-20	137-25-25				
SET II	00-00-00	119-54-10				
	317-26-15	137-25-25				

MEAN = 125-45-03

MEAN = 317-26-17

NOTE: SEE PAGE (4) FOR SKETCH

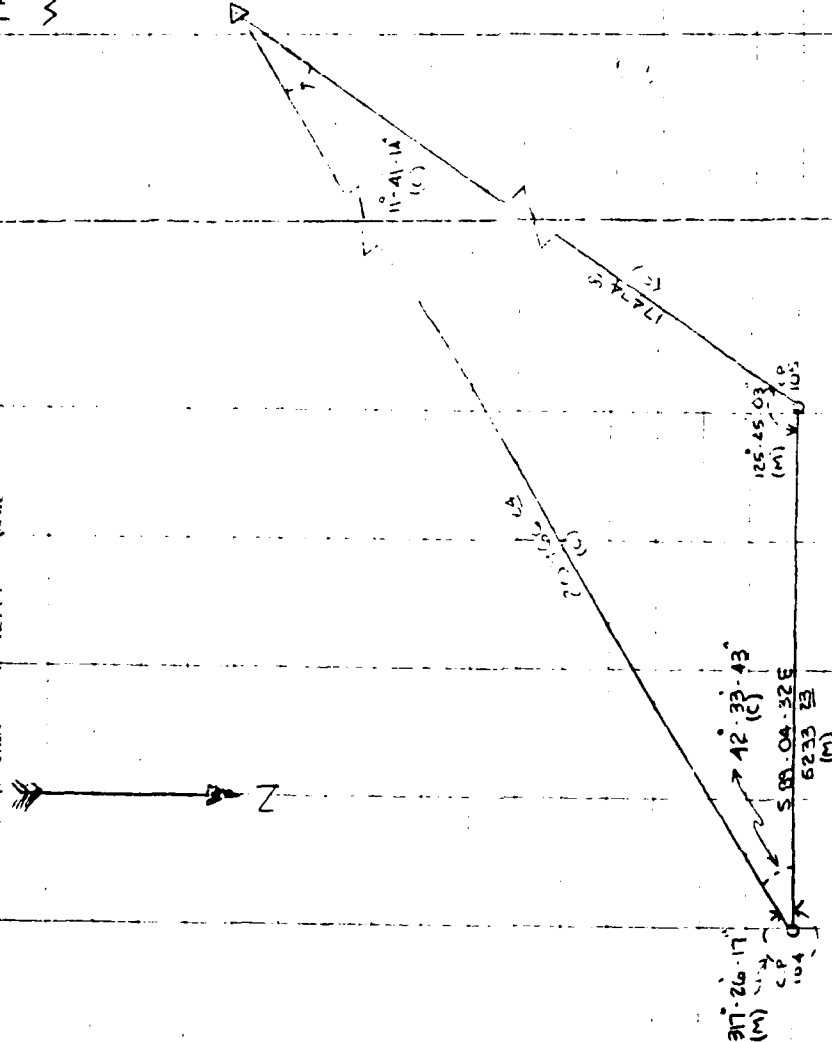
11/24/2020

TRIANGULATION OF WELL SURVEY

North Area

U.S. COAST SURVEY MAPS. SOUTH

NOT TO ANY SCALE



APPENDIX I-F
WELL PURGING LOGS

WATER QUALITY SAMPLING FIELD REPORT

TOOELE ARMY DEPOT

TOOELE, UTAH

FIRST QUARTER, 1987

GROUND WATER SAMPLING, INC. FIELD REPORT

TOCELE ARMY DEPOT
NO HISTORICAL DATA:

WELL: N-3A
DATE 02/28/87

CURRENT DATA:

TIME	GAL	EQUIV C.V.	W.L.	FLOW RATE GPM	PH	COND	TEMP	OTHER
11:55	...	....	.... 242.20	...	..	....	....	....
11:58								PUMPING
12:23								STOP PUMP
12:42								PUMPING
09:02								NO WATER
09:05								3/2/87
09:08				20.00				RECALIBRATE
09:10	40.00				7.10	2250		HOSE PROB.
11:10								PUMPING
11:11				16.00				
11:12	56.00			16.00	7.20	4200		
11:19	168.00			16.00	7.15	4250		
11:23	332.00			16.00	7.05	4400	16.5	
11:25	264.00			16.00	7.05	4400		
11:27	256.00			16.00	7.00	4400		
11:30	344.00			16.00	7.00	4400		
11:33	392.00			16.00	7.10	4400	16.0	
11:35	424.00			16.00	6.95	4450		
11:37	456.00			16.00	6.95	4500		
11:40	504.00			16.00	6.90	4500	16.0	
11:43	552.00			16.00	6.90	4500		
11:44	568.00			16.00	6.90	4500		
11:45	584.00			16.00	6.90	4500	16.0	
11:47	616.00	5.00	242.20	16.00	6.90	4500	16.0	SAMPLE

OBSERVATIONS:

Bailer size: N/A

Color:

Filtration:

Pump size: SF 2-26

Turbidity: CLEAR

Dcon:

T.D.: 341.56'

GROUND WATER SAMPLING, INC. FIELD REPORT

: TOCELE ARMY DEPOT
NO HISTORICAL DATA:

DATE 02/28/87

WELL: N-3A

3. MOTOR HOT ON RETRIEVAL: 3/2/87 EXTENDED PUMP DEPTH.

WELL: N-3A

GROUND WATER SAMPLING, INC. FIELD REPORT

: TOOELE ARMY DEPOT
NO HISTORICAL DATA:

DATE 02/28/87

WELL: N-3B

CURRENT DATA:

TIME	GAL	EQUIV C.V.	W.L.	FLOW RATE GPM	PH	COND	TEMP	OTHER
12:15	2.80	....	56.80	...	7.70	2250	....	MUD
12:18					7.80	2250		
12:43	3.80				8.15	2250		MUD
12:45	3.80		56.80		8.15	2250	14.0	

OBSERVATIONS:

Sailer size: 2.2 GAL

Pump size: N/A

T.D.: 58.7'

Color: GREY

Turbidity: POOR

Odor:

Filtration:

Comments: MUD ONLY; TOTAL .25 GAL WATER NOT ENOUGH WATER TO SAMPLE

WELL: N-3B

SPILL & WATER SAMPLING, INC. FIELD REPORT

: TIDELE ARMY DEPOT
NO HISTORICAL DATA:

DATE 02/28/87 WELL: N-3H

CURRENT DATA:

TIME	GAL	EQUIV C.V.	W.L.	FLOW RATE GPM	PH	COND	TEMP	OTHER
09:45	...	....	....	...	..	....	....	PUMP ON
10:10								NO WATER
10:35								PUMP ON
10:50	25.00				7.40	3400		
11:00	25.00				7.60	3550	14.8	
11:07	53.60			1.20	7.65	3450	14.8	
11:07	65.00				7.70	2550		
11:10	69.00			1.25	7.70	2450	17.0	
11:15	75.00	5.00		1.25	7.50	2400	17.0	SAMPLED

OBSERVATIONS:

Bailer size: N/A

Pump size: SF2-26

T.D.: 260'

Color: CLEAR

Turbidity: CLEAR

Odor:

Filtration: GOOD

Comments: PUMP INTAKE 255 FT. BELOW COLLAR; SLOW RECHARGE RATE: PUMPED
DRY.

WELL: N-3H

GROUND WATER SAMPLING, INC. FIELD REPORT

: TOOELE ARMY DEPOT
NO HISTORICAL DATA:

WELL: N-31
DATE 02/28/87

CURRENT DATA:

TIME	GAL	EQUIV C.V.	W.L.	FLOW RATE GPM	PH	COND	TEMP	OTHER
08:00	...	....	....	...	..	....	....	....
08:26				2.20				PUMPING
08:29	6.60			2.20	6.70	4000		RECALIBRATE
08:30	8.80			.50	6.70	4200	14.0	PUMPED DRY
08:31	10.30			.50	7.00	4200		
08:35	11.30			.50	7.00	4200		
08:38	12.80			.50	7.20	4200		
08:40	13.80			.50	7.20	4200		
08:42	14.80			.50	7.30	4000		
08:46	15.80			.50	7.40	4000	14.0	
08:47	17.30			.50	7.40	4000		
08:48	17.80			.50	7.40	4000		
08:50	18.80	5.00		.50	7.40	4000	14.0	SAMPLE

OBSERVATIONS:

Sailer size: N/A

Pump size: SF-210

T.D.:

Color: BROWN/CLEAR

Turbidity: MEDIUM/SLIGHT

Odor:

Filtration:

Comments: WATER CLEARED UP AT 12.8 GAL. MARK; PUMPED DRY; RECHARGE RATE
.5 GPM.

WELL: N-31

FIELD RECORD OF WELL GAUGING AND PURGING

Site: N-TEAD

Well No: N-3F Gauge Date: 3/3/87 Time: 1300 hrs.

Weather: Cool Sunny

Well Condition: Steel casing lock, gravel pad and cement collar in good shape PVC cap on.

Well Diameter (inches): 2" Dia PVC

Odor (describe): None

Sounding Method: GED Measurement Reference: Top of PVC

Stick up/down (ft): _____

(1) Well Depth (ft): 75.95 Purge Date: 3/3/87 Time: 1315

(2) Depth to Liquid (ft): - Purge Method: Teflon Bailer

(3) Depth to Water (ft): 72.64 Purge Rate (gpm): _____

(4) Liquid Depth [(1)-(2)]: 3.31 Purge Time (min): _____

(5) Liquid Volume [(4)xF] (gal): .50 Purge Volume (gal): ~5 gal

Did Well Pump Dry? Describe: Yes well would bail dry after ~1.0 gal. Allowed to recharge and bailed again.

Comments and Observations: _____

APPENDIX I-G

**INSTALLATION RESTORATION DATA MANAGEMENT (IRDMS) CHEMICAL DATA,
DEFINITIONS, AND CERTIFIED REPORTING LIMITS**

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IRPROJ

100ELE NORTH

CGW

8/24/88

ORIGINAL RUNID- IRPROJ

DATE-24 AUG 88

TIME-13:19:03

COPIES REQUESTED- 001

US ARMY AMCCOM ABERDEEN PROVING GROUND-EDGEWOOD AREA SCIENTIFIC COMPUTER CENTER - - - UNIVAC 1100/70 LEVEL 39R3D

- - - XEROX 9700 ELECTRONIC PRINTING SYSTEM - - -

RUN DATE 24 AUG 88

PAGE NO. 1

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CGW ANALYTICAL RESULTS
SITE TYPE WELL
SITE ID N 3A
DESCRIPTION 7.8

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS ROOT	CONCENTRATION	UNITS MEAS	INT STD
G0A	03/02/87	ET	AG	99	339.3		4600	UGL	
			AS		339.3		7.1000	UGL	
			RA		339.3		52.0000	UGL	
			RE		339.3	LT	8300	UGL	
			CD		339.3	LT	11.9000	UGL	
			CR		339.3	LT	10.8000	UGL	
			CU		339.3	LT	21.3000	UGL	
			CYN		339.3	LT	29.5000	UGL	
			HMX		339.3	LT	5.0700	UGL	
			MEC6H5		339.3		2.0000	UGL	S
			NA		339.3		220000.0000	UGL	
			NI		339.3	LT	65.2000	UGL	
			NIT		339.3		61000.0000	UGL	
			PB		339.3	LT	1.5000	UGL	
			RDX		339.3	LT	4.1900	UGL	
			SB		339.3	LT	7.0000	UGL	
			SE		339.3	LT	2.5000	UGL	
			TETRYL		339.3	LT	4.3900	UGL	
			TL		339.3	LT	1.7000	UGL	
			TRCLE		339.3	LT	1.9000	UGL	
			ZN		339.3		20.0000	UGL	
			13DNB		339.3	LT	9.0800	UGL	
			135TNB		339.3	LT	5.8400	UGL	
			24DNT		339.3	LT	2.2200	UGL	
			246TNT		339.3	LT	6.2500	UGL	
			26DNT		339.3	LT	5.7000	UGL	
			HG		339.3	LT	1.1000	UGL	

INSTALLATION RESTORATION PROGRAM

100FLE AD (NORTH AREA)

CGW ANALYTICAL RESULTS

SITE TYPE : WELL

SITE ID : N-38

DESCRIPTION

SAMPLE PROG	SAMPLE DATE	LAR	NAME	MFTH NUMB	SAMPLE DEPTH(FT)	MEAS BOUL	CONCENTRATION	UNITS MEAS	INT STD
GOA	03/03/87	ET	AG	99	54.1		2300	UGL	
			AS		54.1		110 0000	UGL	
			BE		54.1	LT	8300	UGL	
			CD		54.1	LT	11 9000	UGL	
			CR		54.1		12 0000	UGL	
			CU		54.1		33 0000	UGL	
			CYN		54.1	LT	29 5000	UGL	
			HG		54.1	LT	1 1000	UGL	
			HMX		54.1		17 6000	UGL	
			NA		54.1		320000.0000	UGL	
			NI		54.1	LT	65 2000	UGL	
			NIT		54.1		780 0000	UGL	
			PB		54.1		2 3000	UGL	
			RDX		54.1		100 0000	UGL	
			SB		54.1	LT	7 0000	UGL	
			SE		54.1	LT	2 5300	UGL	
			TETRYL		54.1	LT	4 3900	UGL	
			TL		54.1	LT	1 7000	UGL	
			TRCLE	99	54.1	LT	1 9000	UGL	
GOA	03/02/87	ET	ZN	99	54.1	LT	30 0000	UGL	
GOA	03/03/87	ET	13DNB		54.1	LT	9 0800	UGL	
			135TNR		54.1	GT	100 0000	UGL	
			24DNT		54.1		7 5000	UGL	
			246TNT		54.1		37 4000	UGL	
			26DNT		54.1	LT	5 7000	UGL	
			BA		54.1		81 0000	UGL	

RUN DATE 24 AUG 88

PAGE NO 3

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CGW ANALYTICAL RESULTS
SITE TYPE WELL
SITE ID N 3F
DESCRIPTION

SAMPLE PRUG	SAMPLE DATE	LAB	NAME	METH NUMR	SAMPLE DEPTH(FT)	MEAS ROOT	CONCENTRATION	UNITS MEAS	INT STD
GJA	03/03/87	ET	AG	99	70.7		6000	UGL	
			AS		70.7		18 3000	UGL	
			RE		70.7	LT	8300	UGL	
			CD		70.7	LT	11 9000	UGL	
			CR		70.7		12 0000	UGL	
			CU		70.7		28 0000	UGL	
			CYN		70.7	LT	29 5000	UGL	
			HG		70.6	LT	1 1000	UGL	
			HMX		70.7	LT	5 0700	UGL	
			NA		70.7		1400000 0000	UGL	
			NI		70.7	LT	65 2000	UGL	
			NIT		70.7		35000 0000	UGL	
			PB		70.7	LT	1 5000	UGL	
			RDX		70.7	GT	160 0000	UGL	
			SB		70.7	LT	7 0000	UGL	
			SE		70.7	LT	2 5300	UGL	
			TETRYL		70.7	LT	4 3900	UGL	
GJA GJA	03/02/87 03/03/87	ET ET	TL	99 99	70.7		3 4000	UGL	
			TRCLE		70.7	LT	1 9000	UGL	
			ZN		70.7		30 0000	UGL	
			13DNB		70.7	LT	9 0800	UGL	
			135TNB		70.7	LT	5 8400	UGL	
			24DNT		70.7	LT	2 2200	UGL	
			246TNT		70.7	LT	6 2500	UGL	
			26DNT		70.7	LT	5 7000	UGL	
			BA		70.7		23 0000	UGL	

RUN DATE 24 AUG 88

PAGE NO: 4

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CGW ANALYTICAL RESULTS
SITE TYPE WFL
SITE ID N 311
DESCRIPTION

SAMPLE PROG	SAMPLE DATE	LAR	NAME	METH NUMR	SAMPLE DEPTH(FT)	MEAS BODL	CONCENTRATION	UNITS MEAS	INT STD
GOA	02/28/87	ET	AG	99	231.5	LT	1400	UGL	
			AS		231.5		5.2000	UGL	
			BA		231.5		46.0000	UGL	
			BE		231.5	LT	8300	UGL	
			B2THP		231.5		10.0000	UGL	S
			CD		231.5	LT	11.9000	UGL	
			CR		231.5		15.0000	UGL	
			CU		231.5	LT	21.3000	UGL	
			CYN		231.5	LT	29.5000	UGL	
			HG		231.5	LT	1.1000	UGL	
			HMX	99	231.5	LT	5.0700	UGL	
GOA	03/02/87	ET	MECGH5	99	231.5		13.0000	UGL	S
GOA	02/28/87	ET	NA		231.5	LT	180000.0000	UGL	
			NI		231.5		65.2000	UGL	
			NIT		231.5		9400.0000	UGL	
			PB		231.5		9.8000	UGL	
			PHENOL		231.5		1.0000	UGL	S
GOA	03/02/87	ET	RDX	99	231.5	LT	4.1900	UGL	
GOA	02/28/87	ET	SB	99	231.5	LT	7.0000	UGL	
			SE		231.5		2.5300	UGL	
GOA	03/02/87	ET	TETRYL	99	231.5	LT	4.3900	UGL	
GOA	02/28/87	ET	TL	99	231.5	LT	1.7000	UGL	
			TRCLE		231.5	LT	1.9000	UGL	
			ZN		231.5		90.0000	UGL	
GOA	03/02/87	ET	13DNB	99	231.5	LT	9.0800	UGL	
			135TNR		231.5	LT	5.8400	UGL	
			24DNT		231.5	GT	20.0000	UGL	
			246TNT		231.5	LT	6.2500	UGL	
			26DNT		231.5	LT	5.7000	UGL	

RUN DATE: 24 AUG 88

PAGE NO: 5

INSTALLATION RESTORATION PROGRAM
 100ELE AD (NORTH AREA)
 CGW ANALYTICAL RESULTS
 SITE TYPE: WELL
 SITE ID: N 31
 DESCRIPTION

SAMPLE PROG	SAMPLE DATE	LAB	NAME	MFTH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	02/28/87	ET	AG	99	34.0		1800	UGL	
			AS		34.0		74.0000	UGL	
			BA		34.0		94.0000	UGL	
			BE		34.0	LT	8300	UGL	
			BZALC		34.0		8.0000	UGL	S
			CD		34.0	LT	11.9000	UGL	
			CHCL3		34.0		2.0000	UGL	S
			CR		34.0	LT	10.8000	UGL	
			CU		34.0	LT	21.3000	UGL	
			CYN		34.0	LT	29.5000	UGL	
			HG		34.0	LT	1.1000	UGL	
			HMX	99	34.0		12.2000	UGL	
GQA	03/02/87	ET	MEC6H5	99	34.0		6.0000	UGL	S
GQA	02/28/87	ET	NA		34.0		600000.0000	UGL	
			NI		34.0	LT	65.2000	UGL	
			NIT		34.0		12700.0000	UGL	
			PB		34.0	LT	1.5000	UGL	
			PHENOL		34.0		3.0000	UGL	S
GQA	03/02/87	ET	RDX	99	34.0		76.1000	UGL	
GQA	02/28/87	ET	SB	99	34.0	LT	7.0000	UGL	
			SE		34.0	LT	2.5300	UGL	
GQA	03/02/87	ET	TETRYL	99	34.0	LT	4.3900	UGL	
GQA	02/28/87	ET	TL	99	34.0	LT	1.7000	UGL	
			TRCLE		34.0	LT	1.9000	UGL	
			ZN		34.0		30.0000	UGL	
GQA	03/02/87	ET	13DNB	99	34.0	LT	9.0800	UGL	
			135TNB		34.0	LT	5.8400	UGL	
			24DNT		34.0	LT	2.2200	UGL	
			246TNT		34.0	LT	6.2500	UGL	
			26DNT		34.0	LT	5.7000	UGL	

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CGW ANALYTICAL RESULTS
SITE TYPE: WELL
SITE ID: 4 N
DESCRIPTION:

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
QJA	03/03/87	FT	ARHC	99	622.0	LT	1700	UGL	
			AG		622.0	LT	1400	UGL	
			ALDRN		622.0	LT	1500	UGL	
			AS		622.0	LT	2.4500	UGL	
			BE		622.0	LT	8300	UGL	
			CD		622.0	LT	11.9000	UGL	
			CR		622.0	LT	18.0000	UGL	
			CU		622.0	LT	21.0000	UGL	
			CYN		622.0	LT	29.5000	UGL	
			DLDRN		622.0	LT	2600	UGL	
			ENDRN		622.0	LT	6000	UGL	
			HMX		622.0	LT	5.0700	UGL	
			HPCI		622.0	LT	1600	UGL	
			LIN		622.0	LT	1300	UGL	
			NA		622.0	LT	36000.0000	UGL	
			NB		622.0	LT	6.5000	UGL	
			NI		622.0	LT	65.0000	UGL	
			NI1		622.0	LT	17500.0000	UGL	
			PB		622.0	LT	1.5000	UGL	
			PCB016		622.0	LT	1.3000	UGL	
			PCB260		622.0	LT	2.6000	UGL	
			PPDD0		622.0	LT	2700	UGL	
			PPDDE		622.0	LT	2300	UGL	
			PPDDT		622.0	LT	2700	UGL	
			RDX		622.0	LT	4.1900	UGL	
			SB		622.0	LT	7.0000	UGL	
			SE		622.0	LT	2.5300	UGL	
			TETRYL		622.0	LT	4.3900	UGL	
			TL		622.0	LT	1.7000	UGL	
			TRCLE		622.0	LT	1.9000	UGL	
			ZN		622.0	LT	300.0000	UGL	
			13DNB		622.0	LT	9.0800	UGL	
			135TNR		622.0	LT	5.8400	UGL	
			24DNT		622.0	LT	2.2200	UGL	
			246TNT		622.0	LT	6.2500	UGL	
			26DNT		622.0	LT	5.7000	UGL	
			BA		622.0	LT	85.0000	UGL	
			HG		622.0	LT	1.1000	UGL	

RUN DATE : 24 AUG 88

PAGE NO : 7

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CGW ANALYTICAL RESULTS
SITE TYPE : WELL
SITE ID : 5 N
DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS ROOL	CONC ENTRATION	UNITS MEAS	INT STD
GOA	03/03/87	ET	ABHC	99	340.0	LT	1700	UGL	
			AG		340.0	LT	1400	UGL	
			ALDRN		340.0	LT	1500	UGL	
			AS		340.0	LT	2.4500	UGL	
			BE		340.0	LT	8300	UGL	
			CD		340.0	LT	11.9000	UGL	
			CR		340.0	LT	10.8000	UGL	
			CU		340.0	LT	21.0000	UGL	
			CYN		340.0	LT	29.5000	UGL	
			DLDNR		340.0	LT	2600	UGL	
			ENDRN		340.0	LT	6000	UGL	
			HG		340.0	LT	1.1000	UGL	
			HMX		340.0	LT	5.0700	UGL	
			HPCL		340.0	LT	1600	UGL	
			LIN		340.0	LT	1300	UGL	
			NA		340.0	LT	18000.0000	UGL	
			NI		340.0	LT	65.0000	UGL	
			NIT		340.0	LT	520.0000	UGL	
			PB		340.0	LT	1.5000	UGL	
			PCBO16		340.0	LT	1.3000	UGL	
			PCB260		340.0	LT	2.6000	UGL	
			PPDD		340.0	LT	2700	UGL	
			PPDE		340.0	LT	2300	UGL	
			PPDT		340.0	LT	2700	UGL	
			RDX		340.0	LT	4.1900	UGL	
			SB		340.0	LT	7.0000	UGL	
			SE		340.0	LT	2.5300	UGL	
			TETRYL		340.0	LT	4.3900	UGL	
			TL		340.0	LT	1.7000	UGL	
			TRCLE		340.0	LT	1.9000	UGL	
			ZN		340.0	LT	100.0000	UGL	
			13DNB		340.0	LT	9.0800	UGL	
			135TNB		340.0	LT	5.8400	UGL	
			24DNT		340.0	LT	2.2200	UGL	
			246TNT		340.0	LT	6.2500	UGL	
			26DNT		340.0	LT	5.7000	UGL	
			BA		340.0	LT	133.0000	UGL	

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IRPROJ

100ELE NORTH

CSW

8/24/88

ORIGINAL RUNID- IRPROJ

DATE 24 AUG 88

TIME 13:28.85

COPIES REQUESTED- 001

US ARMY AMCCOM ABERDEEN PROVING GROUND-EDGEWOOD AREA SCIENTIFIC COMPUTER CENTER - - - UNIVAC 1100/70 LEVEL 39R3D

- - - XEROX 5700 ELECTRONIC PRINTING SYSTEM - - -

RUN DATE 24 AUG 88

INSTALLATION RESTORATION PROGRAM
 TOOELE AD (NORTH AREA)
 CSW ANALYTICAL RESULTS
 SITE TYPE LAGO
 SITE ID N1EP
 DESCRIPTION

PAGE NO 1

SAMPLE PROG	SAMPLE DATE	LAB	NAME	ME TH NUMB	SAMPLE DEPTH(FT)	MEAS R001	CONCENTRATION	UNITS MEAS	INT STD
G0A	03/03/87	ET	AG	99	.5		1500	UGL	
			AS		.5		2.7000	UGL	
			BA		.5		61.0000	UGL	
			BE		.5	LT	8300	UGL	
			CD		.5	LT	11.9000	UGL	
			CR		.5		15.0000	UGL	
			CU		.5		32.0000	UGL	
			CYN		.5	LT	29.5000	UGL	
			HG		.5	LT	1.1000	UGL	
			HMX		.5	LT	5.0700	UGL	
			MBAS		.5		120.0000	UGL	
			NA		.5		320000.0000	UGL	
			NI		.5	LT	65.2000	UGL	
			NIT		.5		1180.0000	UGL	
			PB		.5		4.4000	UGL	
			RDX		.5	LT	4.1900	UGL	
			SE		.5	LT	2.5300	UGL	
			TETRYL		.5	LT	4.3900	UGL	
			TL		.5	LT	1.7000	UGL	
			TRCLE		.5	LT	1.9000	UGL	
			ZN		.5		80.0000	UGL	
			13DNB		.5	LT	9.0800	UGL	
			135TNB		.5	LT	5.8400	UGL	
			24DNT		.5	LT	2.2200	UGL	
			246TNT		.5	LT	6.2500	UGL	
			26DNT		.5	LT	5.7000	UGL	

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8/24/88

COPIES REQUESTED - 001

TIME 13:30:08

DATE 24 AUG 88

ORIGINAL RUNID- IRPROJ

US ARMY AMCCOM ABERDEEN PROVING GROUND-EDGEWOOD AREA SCIENTIFIC COMPUTER CENTER - - - UNIVAC 1100/70 LEVEL 39R3D

- - - XEROX 9700 ELECTRONIC PRINTING SYSTEM

RUN DATE: 24 AUG 88

PAGE NO: 1

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CSO ANALYTICAL RESULTS
SITE TYPE : BORE
SITE ID : INTP-1
DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	07/30/86	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0		18.9000	UGG	
			NIT		.3		8.8100	UGG	
			13DNB		.3	LT	.8300	UGG	
			13DNB		1.0	LT	.8300	UGG	
			135TNB		1.0	LT	.5000	UGG	
			24DNT		.3	LT	3.4000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246TNT		.3	LT	8.6000	UGG	
			246TNT		1.0	LT	.3000	UGG	
			26DNT		1.0	LT	.5400	UGG	
			26DNT		.3	LT	.5400	UGG	
			HMX		.3	LT	9.2000	UGG	
			NB		.3	LT	9.2000	UGG	
			135TNB		.3	LT	.5000	UGG	

INSTALLATION RESTORATION PROGRAM

TOOELE AD (NORTH AREA)

CSD ANALYTICAL RESULTS

SITE TYPE : BORE

SITE ID : TNTP-2

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMR	SAMPLE DEPTH(FT)	MEAS R001	CONCENTRATION	UNITS MEAS	INT STD
GOA	07/30/86	ET	HMX	99	1.0	LT	9.2000	UGG	
			HMX		.3	LT	9.2000	UGG	
			NB		.3	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0		18.9000	UGG	
			NIT		.3		17.1000	UGG	
			13DNB		.3	LT	.8300	UGG	
			13DNR		1.0	LT	.8300	UGG	
			135TNB		1.0		18.4000	UGG	
			135TNR		.3		10.0000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			24DNT		.3	LT	3.4000	UGG	
			246TNT		1.0		201.0000	UGG	
			246TNT		.3		5.1000	UGG	
			26DNT		.3	LT	.5400	UGG	
			26DNT		1.0	LT	.5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 3

INSTALLATION RESTORATION PROGRAM
 TOOLE AD (NORTH AREA)
 GSO ANALYTICAL RESULTS
 SITE TYPE : ROPE
 SITE ID : INTP 3
 DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS ROOL	CONCENTRATION	UNITS MEAS	INT STD
G0A	07/30/86	ET	HMX	99	1.0		18.2000	UGG	
			HMX		.3		95.2000	UGG	
			NB		.3	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		.3		60.8000	UGG	
			NIT		1.0		57.2000	UGG	
			13DNB		.3	LT	.8300	UGG	
			13DNB		1.0	LT	.8300	UGG	
			135TNB		1.0		14.4000	UGG	
			135TNB		.3		47.0000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246TNT		.3		822.0000	UGG	
			246TNT		1.0		20700.0000	UGG	
			26DNT		.3		.5400	UGG	
			26DNT		1.0	LT	.5400	UGG	

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CSD ANALYTICAL RESULTS
SITE TYPE : BORE
SITE ID : TINTP 4
DESCRIPTION :

SAMPLE PROC	SAMPLE DATE	LAB	NAME	MFTH NUMB	SAMPLE DEPTH(FT)	MEAS ROOT	CONCENTRATION	UNITS MEAS	INT STD
GA	07/30/86	FT	HMX	99	3.0		17.2000	UGG	
			HMX		4.0		17.6000	UGG	
			HMX		1.0	LT	9.2000	UGG	
			HMX		5.0	LT	9.2000	UGG	
			HMX		3.0	LT	9.2000	UGG	
			HMX		2.0	LT	9.2000	UGG	
			NB		2.0	LT	9.2000	UGG	
			NB		3.0	LT	9.2000	UGG	
			NB		3.0	LT	9.2000	UGG	
			NB		5.0	LT	9.2000	UGG	
			NB		4.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0		52.8000	UGG	
			NIT		2.0		48.9000	UGG	
			NIT		3.0		58.5000	UGG	
			NIT		4.0		55.6000	UGG	
			NIT		3.0		18.9000	UGG	
			NIT		5.0		20.1000	UGG	
			13DNB		2.0	LT	.8300	UGG	
			13DNB		.3	LT	.8300	UGG	
			13DNB		1.0	LT	.8300	UGG	
			13DNB		3.0	LT	.8300	UGG	
			13DNB		5.0	LT	.8300	UGG	
			13DNB		4.0	LT	.8300	UGG	
			135TNB		.3		18.0000	UGG	
			135TNB		1.0		15.3000	UGG	
			135TNB		3.0		9.5000	UGG	
			135TNB		4.0		7.4000	UGG	
			135TNB		5.0		5.9000	UGG	
			135TNB		2.0		11.3000	UGG	
			24DNT		3.0	LT	3.4000	UGG	
			24DNT		2.0	LT	3.4000	UGG	
			24DNT		4.0	LT	3.4000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			24DNT		.3	LT	3.4000	UGG	
			24DNT		5.0	LT	3.4000	UGG	
			246TNT		4.0		68.5000	UGG	
			246TNT		5.0		132.8000	UGG	
			246TNT		3.0		4268.0000	UGG	
			246TNT		2.0		8119.0000	UGG	
			246TNT		1.0		15080.0000	UGG	
			246TNT		.3		1292.0000	UGG	
			26DNT		5.0	LT	.5400	UGG	
			26DNT		2.0	LT	.5400	UGG	
			26DNT		3.0	LT	.5400	UGG	

260NT	3	11	.5400	UGG
260NT	4 0	11	.5400	UGG
260NT	1 0	11	.5400	UGG

RUN DATE: 24 AUG 88

PAGE NO: 6

INSTALLATION RESTORATION PROGRAM
 TODELE AD (NORTH AREA)
 CSD ANALYTICAL RESULTS
 SITE TYPE : SURF
 SITE ID : INT S1
 DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS ROOT	CONCENTRATION	UNITS MEAS	INT STD
GQA	03/03/87	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0	LT	11.1000	UGG	
			RDX		1.0	LT	6.6900	UGG	
			13DNB		1.0	LT	8300	UGG	
			135TNB		1.0	LT	5000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246INT		1.0	LT	5000	UGG	
			26DNT		1.0	LT	5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 7

INSTALLATION RESTORATION PROGRAM

TOTEELE AD (NORTH AREA)

CSD ANALYTICAL RESULTS

SITE TYPE: SURF

SITE ID: TNT-S2

DESCRIPTION:

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STO
GDA	03/03/87	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0	LT	11.1000	UGG	
			RDX		1.0	LT	6.6900	UGG	
			13DNB		1.0	LT	.8300	UGG	
			135TNR		1.0	LT	.5000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246TNT		1.0	LT	.5000	UGG	
			26DNT		1.0	LT	.5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO 8

INSTALLATION RESTORATION PROGRAM
 TOOELE AD (NORTH AREA)
 CSO ANALYTICAL RESULTS
 SITE TYPE : SURF
 SITE ID : INT S3
 DESCRIPTION :

SAMPLE PRG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
G0A	03/03/87	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0	LT	11.1000	UGG	
			RDX		1.0	LT	6.6900	UGG	
			13DNB		1.0	LT	8.300	UGG	
			135TNB		1.0	LT	5.000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246TNT		1.0	LT	5.000	UGG	
			26DNT		1.0	LT	5.400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 9

INSTALLATION RESTORATION PROGRAM

TODELE AD (NORTH AREA)

CSO ANALYTICAL RESULTS

SITE TYPE : SURF

SITE ID : TNT-S4

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMR	SAMPLE DEPTH(FT)	MEAS RODL	CONCENTRATION	UNITS MEAS	INT SID
GOA	03/03/87	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0	LT	11.1000	UGG	
			RDX		1.0	LT	6.6900	UGG	
			13DNB		1.0	LT	8300	UGG	
			135TNR		1.0	LT	5000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246TNT		1.0	LT	5000	UGG	
			26DNT		1.0	LT	5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 10

INSTALLATION RESTORATION PROGRAM
 TOOELE AD (NORTH AREA)
 CSD ANALYTICAL RESULTS
 SITE TYPE : SURF
 SITE ID : INT 55
 DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	MFTH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCFNTRATION	UNITS MEAS	INT STD
GQA	03/03/87	ET	HMX	99	1.0	LT	9 2000	UGG	
			NB		1.0	LT	9 2000	UGG	
			NIT		1.0	LT	11 1000	UGG	
			RDX		1.0	LT	6 6900	UGG	
			130NB		1.0	LT	8300	UGG	
			135TNB		1.0	LT	5000	UGG	
			240NT		1.0	LT	3 4000	UGG	
			246TNT		1.0	LT	5000	UGG	
			260NT		1.0	LT	5400	UGG	

INSTALLATION RESTORATION PROGRAM

100ELE AD (NORTH AREA)

CSO ANALYTICAL RESULTS

SITE TYPE : SURF

SITE ID : TNT-S6

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS R001	CONCENTRATION	UNITS MEAS	INT SID
GDA	03/03/87	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0	LT	11.1000	UGG	
			RDX		1.0	LT	6.6900	UGG	
			130NB		1.0	LT	8300	UGG	
			135TNR		1.0	LT	5000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246TNT		1.0	LT	5000	UGG	
			26DNT		1.0	LT	5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 12

INSTALLATION RESTORATION PROGRAM
 TOOELE AD (NORTH AREA)
 CSO ANALYTICAL RESULTS
 SITE TYPE : SURF
 SITE ID : INT-S7
 DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOUL	CONCENTRATION	UNITS MEAS	INT STD
G0A	03/03/87	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0	LT	11.1000	UGG	
			RDX		1.0	LT	6.6900	UGG	
			13DNB		1.0	LT	8.300	UGG	
			135TNB		1.0	LT	.5000	UGG	
			24DNT		1.0	LT	3.4000	UGG	
			246TNT		1.0	LT	5000	UGG	
			26DNT		1.0	LT	5400	UGG	

RUN DATE : 24 AUG 88

PAGE NO: 13

INSTALLATION RESTORATION PROGRAM

TOOELE AD (NORTH AREA)

CSO ANALYTICAL RESULTS

SITE TYPE : SURF

SITE ID : TNT-S8

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	03/03/87	ET	HMX	99	1.0	LT	9.2000	UGG	
			NB		1.0	LT	9.2000	UGG	
			NIT		1.0	LT	11.1000	UGG	
			RDX		1.0	LT	6.6900	UGG	
			13DNB		1.0	LT	8300	UGG	
			1351NB		1.0	LT	5000	UGG	
			240NT		1.0	LT	3.4000	UGG	
			246TNT		1.0	LT	5000	UGG	
			260NT		1.0	LT	5400	UGG	

INSTALLATION RESTORATION PROGRAM

TOOELE AD (NORTH AREA)

CSO ANALYTICAL RESULTS

SITE TYPE : SURF

SITE ID : N 3C

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS ROOL	CONCENTRATION	UNITS MEAS	INT STD
GOA	03/02/87	ET	HMX	99	5	LT	9.2000	UGG	
			NB		5	LT	9.2000	UGG	
			NIT		5	LT	11.1000	UGG	
			RDX		5	LT	6.6900	UGG	
			13DNB		5	LT	8.300	UGG	
			135TNR		5	LT	5000	UGG	
			24DNT		5	LT	3.4000	UGG	
			246TNT		5	LT	5000	UGG	
			26DNT		5	LT	5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 15

INSTALLATION RESTORATION PROGRAM
 TOOELE AD (NORTH AREA)
 CSO ANALYTICAL RESULTS
 SITE TYPE: SURF
 SITE ID: N 301
 DESCRIPTION:

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GOA	03/02/87	ET	HMX	99	.5	LT	9.2000	UGG	
			NB		.5	LT	9.2000	UGG	
			NTT		.5	LT	11.1000	UGG	
			RDX		.5	LT	6.6900	UGG	
			13DNB		.5	LT	8300	UGG	
			135TNR		.5	LT	5000	UGG	
			24DNT		.5	LT	3.4000	UGG	
			246TNT		.5	LT	5000	UGG	
			26DNT		.5	LT	5400	UGG	

INSTALLATION RESTORATION PROGRAM

TOOFLE AD (NORTH AREA)

CSO ANALYTICAL RESULTS

SITE TYPE : SURF

SITE ID : N-3E

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	03/02/87	ET	HMX	99	.5	LT	9.2000	UGG	
			NB		.5	LT	9.2000	UGG	
			NIT		.5	LT	11.1000	UGG	
			RDX		.5	LT	6.6900	UGG	
			13DNB		.5	LT	.8300	UGG	
			135TNB		.5	LT	.5000	UGG	
			24DNT		.5	LT	3.4000	UGG	
			246TNT		.5	LT	.5000	UGG	
			26DNT		.5	LT	.5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 17

INSTALLATION RESTORATION PROGRAM
 TOOELE AD (NORTH AREA)
 CSO ANALYTICAL RESULTS
 SITE TYPE : SURF
 SITE ID : N-3H
 DESCRIPTION

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BODI	CONCENTRATION	UNITS MEAS	INT STD
GJA	03/02/87	F	HMX	99	.5	LT	9.2000	UGG	
			NB		.5	LT	9.2000	UGG	
			NIT		.5	LT	11.1000	UGG	
			RDX		.5	LT	6.6900	UGG	
			13DNB		.5	LT	8300	UGG	
			135TNB		.5	LT	5000	UGG	
			24DNT		.5	LT	3.4000	UGG	
			246TNT		.5	LT	5000	UGG	
			26DNT		.5	LT	5400	UGG	

RUN DATE: 24 AUG 98

PAGE NO. 18

INSTALLATION RESTORATION PROGRAM

TOOELE AD (NORTH AREA)

CSO ANALYTICAL RESULTS

SITE TYPE : SURF

SITE ID : N-31

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	03/02/87	ET	HMX	99	.5	LT	9.2000	UGG	
			NB		.5	LT	9.2000	UGG	
			NIT		.5	LT	11.1000	UGG	
			RDX		.5	LT	6.6900	UGG	
			13DNB		.5	LT	.8300	UGG	
			135TNB		.5	LT	.5000	UGG	
			24DNT		.5	LT	3.4000	UGG	
			246TNT		.5	LT	.5000	UGG	
			26DNT		.5	LT	.5400	UGG	

RUN DATE: 18 OCT 88

PAGE NO: 19

INSTALLATION RESTORATION PROGRAM

TOOELE AD (NORTH AREA)

CSE ANALYTICAL RESULTS

SITE TYPE : SURF

SITE ID : N-NTP

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GOA	03/02/87	ET	HMX	99	.5	LT	9.2000	UGG	
			NB		.5	LT	9.2000	UGG	
			NIT		.3	LT	11.1000	UGG	
			RDX		.5	LT	6.6900	UGG	
			13DNB		.5	LT	8300	UGG	
			135TNB		.5	LT	.5000	UGG	
			24DNT		.5	LT	3.4000	UGG	
			246TNT		.5	LT	.5000	UGG	
			26DNT		.5	LT	.5400	UGG	

RUN DATE: 18 OCT 88

PAGE NO: 20

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CSE ANALYTICAL RESULTS
SITE TYPE: LAGO SED
SITE ID: N-LEP
DESCRIPTION:

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	03/03/87	ET	AG		.5		.0200	UGG	
			AS		.5		4.3000	UGG	
			BA		.5		39.8000	UGG	
			BE		.5	LT	.0420	UGG	
			CD		.5	LT	.6000	UGG	
			CR		.5		5.5000	UGG	
			CU		.5		4.0000	UGG	
			HG		.5	LT	.2200	UGG	
			HMX	99	.5	LT	9.2000	UGG	
GQA	03/02/87	ET	NA	99	.5		400.0000	UGG	
GQA	03/03/87	ET	NB	99	.5	LT	9.2000	UGG	
GQA	03/02/87	ET	NI		.5		5.1000	UGG	
			NIT		.5	LT	11.1000	UGG	
			PB		.5		2.4400	UGG	
5QA	03/02/87	ET	RDX	99	.5	LT	6.6900	UGG	
GQA	03/03/87	ET	SB	99	.5	LT	.3500	UGG	
			SE		.5	LT	.1300	UGG	
			TL		.5	LT	.0850	UGG	
			TPCLE		.5	LT	.1440	UGG	
			ZN		.5		16.2000	UGG	
GQA	03/02/87	ET	13DNB	99	.5	LT	.8300	UGG	
			135TNB		.5	LT	.5000	UGG	
			24DNT		.5	LT	3.4000	UGG	
			246DNT		.5	LT	.5000	UGG	
			26DNT		.5	LT	.5400	UGG	

RUN DATE: 24 AUG 88

PAGE NO: 21

INSTALLATION RESTORATION PROGRAM

TOOELE AD (NORTH AREA)

CSO ANALYTICAL RESULTS

SITE TYPE : COMP

SITE ID : PCB-ST

DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	02/23/87	ET	PCB016	99	2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0700	UGG	
			PCB254		2.0	LT	.0191	UGG	
			PCB254		2.0	LT	.0990	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB260		2.0	LT	.0700	UGG	
			PCB260		2.0	LT	.0700	UGG	
			PCB260		2.0	LT	.1080	UGG	
			PCB260		2.0	LT	.1000	UGG	
			PCB260		2.0	LT	.0700	UGG	
			PCB260		2.0	LT	.0700	UGG	

INSTALLATION RESTORATION PROGRAM
 TOOELE AD (NORTH AREA)
 CSD ANALYTICAL RESULTS
 SITE TYPE : COMP
 SITE ID : PCB-SL
 DESCRIPTION :

SAMPLE PRGR	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GOA	02/20/87	ET	PCB016	99	2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0700	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0710	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB260		2.0	LT	.0804	UGG	
			PCB260		2.0	LT	.1150	UGG	
			PCB260		2.0	LT	.2140	UGG	
			PCB260		2.0	LT	.1740	UGG	
			PCB260		2.0	LT	.0764	UGG	

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

ALPHABETIC SORT BY CODES:

AACHXE	ACETIC ACID, CYCLOHEXYL ESTER
ABHC	ALPHA-BENZENEHEXACHLORIDE / ALPHA-HEXACHLOROCYCLOHEXANE
AC	HYDROGEN CYANIDE / HYDROCYANIC ACID
ACDHMW	ACIDS (HIGH MOLECULAR WEIGHT)
ACET	ACETONE
ACHE	ANTICHOLINESTERASE
ACIDIT	ACIDITY
ACPHN	ACETOPHENONE
ACROLN	ACROLEIN
ACRYLO	ACRYLONITRILE
ADHP	AMMONIUM DIHYDROGEN PHOSPHATE
AENSLF	ALPHA-ENDOSULFAN / ENDOSULFAN I
AG	SILVER
AL	ALUMINIUM
ALAL	ALIPHATIC ALCOHOL
ALDEHY	ALDEHYDES
ALDRN	ALDRIN
ALHC	ALIPHATIC HYDROCARBON
ALHMW	ALCOHOLS (HIGH MOLECULAR WEIGHT)
ALK	ALKALINITY
ALKBIC	ALKALINITY BICARBONATE
ALKCAR	ALKALINITY CARBONATE
ALKHYD	ALKALINITY HYDROXIDE
ALKN	ALKANE
ANAPNE	ACENAPHTHENE
ANAPYL	ACENAPHTHYLENE
ANELNT	ANION ELUENT
ANIL	ANILINE
ANTRC	ANTHRACENE
ANTRCN	9-ANTHRACENECARBONITRILE
ANTRQU	9,10-ANTHRACENEDIONE / ATHRAQUINONE
AS	ARSENIC
ASBEST	ASBESTOS
ASEXT	ARSENIC EXTRACTABLE
ASTOT	ARSENIC TOTAL
ATNBA	2,4,6-TRINITROBENZALDEHYDE
ATNT	ALPHA-TRINITROTOLUENE (OBSOLETE; USE 246TNT)
ATZ	ATRAZINE
AYLETH	ALLYL ETHER
AZACN	AZACYLONONANE
B	BORON
BA	BARIUM
BAANTR	BENZO [A] ANTHRACENE
BAHXE	BUTANOIC ACID, 1-HEXYL ESTER
BAPYR	BENZO [A] PYRENE
BBFANT	BENZO [B] FLUORANTHENE
BBFLRE	BENZO [B] FLUORENE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

BBHC	BETA-BENZENEHEXACHLORIDE / BETA-HEXACHLOROCYCLOHEXANE
BBNTHP	BENZO [B] NAPHTHO[1,2-D] THIOPHENE
BBZP	BUTYLBENZYL PHTHALATE
BCHPD	BICYCLO [2,2,1] HEPTA-2,5-DIENE
BCLME	BIS(CHLOROMETHYL) ETHER
BCPHCE	2,2-BIS(CHLOROPHENYL)CHLOROETHYLENE DDT RELATED
BCY3HX	BICYCLO [3,1,0] HEXANE
BDADME	BUTANEDIOIC ACID, DIMETHYL ESTER
BE	BERYLLIUM
BEETO	1-(2-BUTOXYETHOXY)ETHANOL
BENSLF	BETA-ENDOSULFAN / ENDOSULFAN II
BENZA	BENZANTHRONE
BENZAL	BENZALDEHYDE
BENZID	BENZIDINE
BENZO	BENZOIC ACID
BEP	2-BUTOXYETHANOL PHOSPHATE
BF2ANT	BENZOBIFLUOROANTHENE
BGHIFA	BENZO [GHI] FLUROANTHENE
BGHIPY	BENZO [G,H,I] PERYLENE
BICYHX	BICYCLOHEXYL
BIDBI	1,5-BIS(1,1DIMETHYLETHYL)-3,3-DIMETHYLBICYCLO[3.1.0]- HEXANE-2-ONE
BINAP	BINAPHTHYL
BJFANT	BENZO [J] FLUORANTHENE
BRFANT	BENZO [K] FLUORANTHENE
BLDX	BLADEX
BMP	BUTYLMETHYL PHTHALATE
BOD	BIOLOGICAL OXYGEN DEMAND
BPBG	BUTYLPHTHALYL BUTYLGLYCOLATE
BRCLM	BROMOCHLOROMETHANE
BRDCLM	BROMODICHLOROMETHANE
BRMCIL	BROMACIL
BTA	BENZOTHIAZOLE
BTMSOA	BIS(TRIMETHYLSILYL) OXALIC ACID
BUEETH	BUTYLETHYL ETHER
BZ	3-QUINUCLIDINYL BENZILATE
BZALC	BENZYL ALCOHOL
BZAL2M	ALPHA,ALPHADIMETHYLBENZENEMETHANOL
BZAPAN	BENZO [A] PHENANTHRENE
BZCPAN	BENZO [C] PHENANTHRENE
BZFANT	BENZFLUORANTHENE
BZHQUN	BENZO [H] QUINOLINE
BZOAME	BENZOIC ACID, METHYL ESTER / METHYL BENZOATE
BZOTHP	BENZO [B] THIOPHENE
BZOTRZ	1H-BENZOTRIAZOLE / 1,2,3-BENZOTRIAZOLE
BZPA	BENZENEPHOSPHONIC ACID
BZYLBR	BENZYL BROMIDE / ALPHA-BROMOTOLUENE
B2CEXM	BIS(2-CHLOROETHOXY)METHANE
B2CIPE	BIS(2-CHLOROISOPROPYL) ETHER
B2CLEE	BIS(2-CHLOROETHYL) ETHER

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

B2EHP	BIS(2-ETHYLHEXYL) PHTHALATE
CA	CALCIUM
CAC03S	CALCIUM CARBONATE SOLUTION
CALLMW	HYDROCARBONS (ALL MOLECULAR WEIGHTS)
CAME	CARBAMIC ACID, METHYL ESTER
CAMP	CAMPHOR
CAPLCT	CAPROLACTAM / 6-AMINOHEXANOIC ACID LACTAM
CARBAZ	9H-CARBAZOLE
CBA	O-CHLOROBENZALDEHYDE
CBCCH	CIS-1-BROMO2-CHLOROCYCLOHEXANE
CBOA	O-CHLOROBENZOIC ACID
CCLF2	CHLORODIFLUOROMETHANE
CCLF3	TRIFLUOROCHLOROMETHANE
CCL2F2	DICHLORODIFLUOROMETHANE
CCL3F	TRICHLOROFLUOROMETHANE
CCL4	CARBON TETRACHLORIDE
CC3	XXCC3
CD	CADMIUM
CDACH	CIS-1,2-DIACETOXYCYCLOHEXANE
CDCL3	CHLOROFORM-D
CDNBIS	CHLORODINITROBENZENE ISOMER
CD2CL2	METHYLENE CHLORIDE-D2
CEC	CATION EXCHANGE CAPACITY
CG	PHOSGENE / CARBONYL CHLORIDE
CHBR3	BROMOFORM
CHCL3	CHLOROFORM
CHO	1,2-CYCLOHEXANE OXIDE
CHOLA	CHOLESTANE
CHONE	CYCLOHEXANONE
CHRY	CHRYSENE
CH2CL2	METHYLENE CHLORIDE
CH3BR	BROMOMETHANE
CH3CL	CHLOROMETHANE
CH3CN	ACETONITRILE
CK	CYANOGEN CHLORIDE
CL	CHLORIDE
CLCYHX	CHLOROCYCLOHEXANE
CLC6D5	CHLOROBENZENE-D5
CLC6H5	CHLOROBENZENE
CLD	CHLORINE DEMAND
CLDAN	CHLORDANE
CLDEN	CHLORDENE
CLNAP	CHLORONAPHTHALENES
CLO3	CHLORATE
CLP	CHLOROPHENOLS
CLVRA	2-CHLOROVINYL ARSONIC ACID
CLXB	CHLORINATED BENZENES
CLXNAP	CHLORINATED NAPHTHALENES
CL2	CHLORINE
CL2BP	DICHLOROBIPHENYLS

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

CL2BZ	DICHLOROBENZENES
CL2NAP	DICHLORONAPHTHALENES
CL3BP	TRICHLOROBIPHENYLS
CL3C3E	TRICHLOROPROPENES
CL3NAP	TRICHLORONAPHTHALENES
CL3P	TRICHLOROPHENOLS
CL4BP	TETRACHLOROBIPHENYLS
CL4NAP	TETRACHLORONAPHTHALENES
CL5B	PENTACHLOROBENZENE
CL5BP	PENTACHLOROBIPHENYLS
CL5ET	PENTACHLOROETHANE
CL6BP	HEXACHLOROBIPHENYLS
CL6BZ	HEXACHLOROBENZENE
CL6CP	HEXACHLOROCYCLOPENTADIENE
CL6ET	HEXACHLOROETHANE
CL7BP	HEPTACHLOROBIPHENYLS
CL7NB	HEPTACHLORONORBORNADIENES
CMONOX	CARBON MONOXIDE
CN	CHLOROACETOPHENONE
CO	COBALT
COD	CHEMICAL OXYGEN DEMAND
COND	SPECIFIC CONDUCTIVITY
COND-F	SPECIFIC CONDUCTIVITY AS TESTED IN FIELD (RM, SEMI-QUANT ONLY)
COUMRN	2,3-DIHYDROBENZOFURAN / COUMARAN
CO3	CARBONATE
CPCXAL	CYCLOPENTANECARBOXALDEHYDE
CPMS	P-CHLOROPHENYLMETHYL SULFIDE
CPMSO	P-CHLOROPHENYLMETHYL SULFOXIDE
CPMSO2	P-CHLOROPHENYLMETHYL SULFONE
CPO	CYCLOPENTANONE
CR	CHROMIUM
CRHEX	HEXAVALENT CHROMIUM
CRO4	CHROMATE
CS	CESIUM
CSOL	CRESOLS
CS2	CARBON DISULFIDE
CU	COPPER
CUEXT	COPPER EXTRACTABLE
CUTOT	COPPER TOTAL
CX	PHOSGENE OXIME / DICHLOROFORMOXIME
CYDODC	CYCLODODECANE
CYHX	CYCLOHEXANE
CYHXB	CYCLOHEXYLBENZENE / PHENLYCYCLOHEXANE
CYN	CYANIDE
CYNF	CYANIDE, FREE FORM
CYOCTE	CYCLOOCTATETRAENE
CYPD	CYCLOPENTADIENE
CYPNE	CYCLOPENTENE
CIADME	CARBONIC ACID, DIMETHYL ESTER
C10	DECANE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

C11	HENDECANE
C12	DODECANE
C12AMH	8-METHYLDECANOIC ACID, METHYL ESTER
C12DCE	CIS-1,2-DICHLOROETHENE
C13	TRIDECANE
C13DCP	CIS-1,3-DICHLOROPROPYLENE / CIS-1,3-DICHLOROPROPENE
C14	TETRADECANE
C14A	TETRADECANOIC ACID / MYRISTIC ACID
C14AME	TETRADECANOIC ACID, METHYL ESTER
C15	PENTADECANE
C15A	PENTADECANOIC ACID
C16	HEXADECANE
C16A	HEXADECANOIC ACID / PALMITIC ACID
C16ABE	HEXADECANOIC ACID, BUTYL ESTER
C16ADM	HEXADECANOIC ACID, DIMETHYL ESTER
C16AEH	HEXADECANOIC ACID, BIS(2-ETHYLHEXYL) ESTER
C16AME	HEXADECANOIC ACID, METHYL ESTER
C16SAT	SATURATED HYDROCARBONS (C16)
C17	HEPTADECANE
C17AM	HEPTADECANOIC ACID, METHYL ESTER
C18	OCTADECANE
C18ABE	OCTADECANOIC ACID, BUTYL ESTER
C18AE	OCTADECANOIC ACID, ETHYL ESTER
C18AME	OCTADECANOIC ACID, METHYL ESTER
C18AOD	OCTADECANOIC ACID, OCTADECYL ESTER
C18UNS	C18H300 UNKNOWN
C185FP	BIS(PENTAFLUOROPHENYL)PHENYL PHOSPHINE
C19	NONADECANE
C19A	NONADECANOIC ACID
C2AVE	ACETIC ACID, VINYL ESTER / VINYL ACETATE
C2H3CL	CHLOROETHENE / VINYL CHLORIDE
C2H5CL	CHLOROETHANE
C20	EICOSANE
C21	HENEICOSANE
C22UNS	C22H400 UNKNOWN
C25	PENTACOSANE
C3AME	PROPANOIC ACID , METHYL ESTER
C30AME	TRIACONTANOIC ACID, METHYL ESTER
C36	HEXATRIACONTANE
C4	BUTANE
C4HX1L	CIS-4-HEXEN1-OL
C5A	PENTANOIC ACID / VALERIC ACID
C6D6	BENZENE-D6
C6HOH	CYCLOHEXANOL
C6H6	BENZENE
C7A	HEPTANOIC ACID
C7NB1	HEPTACHLORONORBORNENE
C8AME	OCTANOIC ACID, METHYL ESTER
C9	NONANE
DBAHA	DIBENZO [A,H] ANTHRACENE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

DBATTS	2,4-DIHYDROXYBENZOIC ACID, TRIS-TRIMETHYSILYL
DBCP	DIBROMOCHLOROPROPANE
DBHC	DELTA-BENZENEHEXACHLORIDE / DELTA-HEXACHLOROCYCLOHEXANE
DBRCLM	DIBROMOCHLOROMETHANE
DBTSPY	4,5-DIMETHYL-2,6-BIS(TRIMETHYLSILOXY)PYRIMIDINE
DBZFUR	DIBENZOFURAN
DBZTHP	DIBENZOTHIOPHENE
DCAMBA	2-METHOXY-3,6-DICHLOROBENZOIC ACID
DCBPH	DICHLOROBENZOPHENONE
DCHP	DICYCLOHEXYL PHTHALATE
DCMBF	5,7-DICHLORO-2-METHYLBENZOFURAN
DCMP5X	DECAMETHYLCYCLOPENTASILOXANE
DCPD	DICYCLOPENTADIENE
DDVP	VAPONA
DEA	DIETHYLAMINE
DECYLB	DECYLBENZENE
DEDMP	DIETHYLDIMETHYL DIPHOSPHONATE
DEETH	DIETHYL ETHER
DEGLYC	2,2-OXYBISETHANOL / DIETHYLENE GLYCOL
DEP	DIETHYL PHTHALATE
DEPD4	DIETHYL PHTHALATE-D4
DHBZPY	3,4-DIHYDRO-2H-1-BENZOPYRAN
DHDMAC	9,10-DIHYDRO-9,9-DIMETHYLACRIDINE
DIACAL	DIACETONE ALCOHOL / 4-HYDROXY-4-METHYL-2-PENTANONE
DIADS	BIS(DIISOPROPYLAMINOETHYL) DISULFIDE
DIAEL	DIISOPROPYLAMINOETHANOL
DIAEP	S-DIISOPROPYLAMINOETHYLMETHYL PHOSPHONOTHIOATE
DIAET	DIISOPROPYLAMINOETHANETHIOL
DIAS	BIS(DIISOPROPYLAMINOETHYL) SULFIDE
DIAZ	DIAZINON
DIBP	DIISOBUTYL PHTHALATE
DICLP	DICHLOROPHENOLS
DIDDP	DIISOPROPYLDIMETHYL DIPHOSPHONATE
DIH2O	DEIONIZED WATER
DIMP	DIISOPROPYLMETHYL PHOSPHONATE
DIOP	DIISOOCTYL PHTHALATE
DIPUR	DIISOPROPYLUREA
DITH	DITHIANE
DLDRN	DIELDRIN
DL2HPG	DL-2-(3-HYDROXYPHENYL)GLYCINE
DM	ADAMSITE
DMA	DIMETHYLANILINE (OBSOLETE; USE NNDMA)
DMCAR	DIMETHYL DITHIOCARBONATE
DMCPDE	1,2-DIMETHYLCYCLOPENTADIENE
DMDS	DIMETHYL DISULFIDE
DMETH	DIMETHYL ETHER
DMIP	DIMETHYL ISOPHTHALATE
DMMP	DIMETHYLMETHYL PHOSPHATE
DMP	DIMETHYL PHTHALATE
DMPCHE	3-(2,2-DIMETHYLPROPOXY)CYCLOHEXENE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

DMPTHF	2,2-DIMETHYL-5-(1-METHYLPROPYL)TETRAHYDROFURAN
DMXDMS	DIMETHOXYDIMETHYLSILANE
DMLACH	2,2-DIMETHYL-1-ACETYLCYCLOHEXANE
DNBEE	1,1-DI-N-BUTYLETHYLENE / 1,1-DI-N-BUTYLETHENE
DNBP	DI-N-BUTYL PHTHALATE
DNOP	DI-N-OCTYL PHTHALATE
DNOPD4	DI-N-OCTYL PHTHALATE-D4
DNPP	DI-N-PENTYL PHTHALATE
DNTISO	DINITROTOLUENE ISOMER
DO	DISSOLVED OXYGEN
DOAD	DIOCTYL ADIPATE
DOAZ	DIOCTYL AZELATE
DODECB	DODECYLBENZENE
DOETH	DIOCTYL ETHER
DOPAM	4-(2-AMINOETHYL)PYROCATECHOL / DOPAMINE
DPA	DIPHENYLAMINE
DPETH	DIPHENYL ETHER
DPETYN	1,1-(1,2-ETHYNEEDIYL)BIS[BENZENE]
DPHNY	DIPHENYL
DPNTLL	D-(-)-PANTOLYL LACTONE
DPSO	DIPHENYL SULFOXIDE
DPSULF	1,1-THIOBIS [BENZENE] / DIPHENYLSULFIDE
DSEDIN	DISELENODIINDOLE
DTB4C	2,6-DI-TERTBUTYL-4-CRESOL
DTCHBO	1.ALPHA.(E),4.ALPHA.-1-(1,4-DIHYDROXY-2,6,6-TRIMETHYL-2-CYCLOHEXEN-1-YL)-2-BUTEN-1-ONE
DURS	DURSBAN
DYSCAN	GC-MS DYE SCAN
EBCPGL	ETHYL-2,2-BIS(4-CHLOROPHENYL) GLYCOLATE
ED	DICHLOROETHYL ARSINE
EDBDAS	3-PHENYLPROPANOYL
EICOSL	1-EICOSANOL
EMP	ETHYLMETHYL PHOSPHONATE
EMPA	ETHYLMETHYL PHOSPHONIC ACID
ENDRN	ENDRIN
ENDRNA	ENDRIN ALDEHYDE
ENHETH	ETHYL-N-HEXYL ETHER
ESFSO4	ENDOSULFAN SULFATE
ETBD10	ETHYLBENZENE-D10
ETCYHX	ETHYLCYCLOHEXANE
ETC6H5	ETHYLBENZENE
ETOH	ETHANOL
F	FLUORIDE
FABPEE	FORMIC ACID, BETA-PHENYLETHYL ESTER
FACHXE	FORMIC ACID, CYCLOHEXYL ESTER
FANT	FLUORANTHENE
FARN	FARNESOL
FATAL	FATTY ALCOHOL
FE	IRON
FLRENE	FLUORENE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

FREON	FREON / DICHLOROFLUOROMETHANE
F10BP	DECAFLUOROBIPHENYL
GA	TABUN / ETHYL-N,N-DIMETHYL PHOSPHORAMIDOCYANIDATE
GB	SARIN / ISOPROPYLMETHYL PHOSPHONOFUORIDATE
GD	SOMAN / PINACOLYLMETHYL PHOSPHONOFUORIDATE
GRNDY	GREEN DYE
H	LEVINSTEIN MUSTARD
HARD	TOTAL HARDNESS
HCBD	HEXACHLOROBUTADIENE
HCNB	HEXACHLORONORBORNADIENE
HCO3	BICARBONATE
HD	DISTILLED MUSTARD / BIS(2-CHLOROETHYL) SULFIDE
HEXANE	HEXANE
HG	MERCURY
HGEXT	MERCURY EXTRACTABLE
HGTOT	MERCURY TOTAL
HMTCHE	2,6,10,15,19,23-HEXAMETHYL-2,6,10,14,18,22-TETRACOSAHEXAENE
HMX	CYCLOTETRAMETHYLENETETRANITRAMINE
HN	NITROGEN MUSTARD
HPCL	HEPTACHLOR
HPCLE	HEPTACHLOR EPOXIDE
HPLH2O	HPLC GRADE WATER
HPO4	HYDROLYZABLE PHOSPHATE
HWX013	HALOWAX 1013
HWX099	HALOWAX 1099
HXADBE	HEXANEDIOIC ACID, DIBUTYL ESTER / DIBUTYL ADIPATE
HXADOE	HEXANEDIOIC ACID, DIOCTYL ESTER
HXCCS	HEXACOSANE
HXHMAZ	4,5,6,7,8,8A-HEXAHYDRO-8A-METHYL-2-[1H]-AZULENONE
HXMETA	1,3,5,7-TETRAAZATRICYCLO [3.3.13.7] DECANE / HEXAMETHYLENE TETRAMINE
HXMTSX	HEXAMETHYLCYCLOTRISILOXANE
HYDRND	1H-INDENE, OCTAHYDRO- / HYDRINDANE
HYDR2	HYDRAZINE
HYNB	7-HYDROXYNORBORNADIENE
H2S	HYDROGEN SULFIDE
H3PO4	PHOSPHORIC ACID
ICDPYR	INDENO [1,2,3-C,D] PYRENE
IMP	ISOPROPYLMETHYL PHOSPHONATE
IMPA	ISOPROPYLMETHYL PHOSPHONIC ACID
INDAN	1-HYDROXY-2,3-METHYLENE INDAN [M.W.146]
ISODR	ISODRIN
ISOPBZ	ISOPROPYLBENZENE / CUMENE
ISOPHR	ISOPHORONE
ISOQUN	ISOQUINOLINE
I4HXDE	1,4 - HEXADIENE
K	POTASSIUM
KEND	KETOENDRIN
L	LEWISITE
LACYBB	LACTIC ACID CYCLIC BUTANEBORONATE
LAURIC	LAURIC ACID

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

LIN	LINDANE / GAMA-BENZENEHEXACHLORIDE / GAMMA-HEXACHLOROCYCLOHEXANE
LIPID	% LIPIDS
LO	LEWISITE OXIDE
MALO	MALONONITRILE
MBADOE	3-METHYLBUTANOIC ACID, 3,7-DIMETHYL-2,4,6-OCTATRIENYL ESTER
MBAS	FOAMING AGENTS / METHYALYNE BLUE ACTIVE SUBSTANCE
MBOH	ALPHA-METHYLBENZYL ALCOHOL
MBZA	ALPHA-METHYLBENZYL ACETOACETATE
MBZCAC	5-METHYLBENZO [C] ACRIDINE
MBZCL	ALPHA-METHYLBENZYL-2-CHLOROACETOACETATE
MDCL	2-METHYLUNDECANAL / 2-METHYLHENDECANAL
MEBPIP	1,1'-METHYLENEBIS [PIPERIDINE]
MECC6	METHYLCYCLOHEXANE
MECYBU	METHYLCYCLOBUTANE
MECYDC	METHYLCYCLODECANE
MECYPE	METHYLCYCLOPENTANE
MEC6D8	TOLUENE-D8
MEC6H5	TOLUENE
MEHG	METHYL MERCURY
MEK	METHYLETHYL KETONE
MEOH	METHANOL
MEPOH	2-METHYLPENTANOL
MESTOX	MESITYL OXIDE / 4-METHYL-3-PENTEN-2-ONE
METLAP	METHYLNAPHTHALENES
MEXCLR	METHOXYCHLOR
ME2C11	DIMETHYLUNDECANES
ME2HPL	METHYL-2-HEPTANOLS
ME2HPO	METHYL-2-HEPTANONES
ME2NAP	DIMETHYLNAPHTHALENES
ME3C6	TRIMETHEXANES
ME3C10	TRIMETHYLDECANES
ME3C11	TRIMETHYLUNDECANES
ME3NAP	TRIMETHYLNAPHTHALENES
MG	MAGNESIUM
MHYDRZ	METHYLHYDRAZINE
MIBK	METHYLISOBUTYL KETONE
MIPK	METHYLISOPROPYL KETONE
MIREX	MIREX
MLTHN	MALATHION
MN	MANGANESE
MNBK	METHYL-N-BUTYL KETONE / 2-HEXANONE
MO	MOLYBDENUM
MP	METHYLPHENOLS
MPA	METHYLPHOSPHONIC ACID
MPDDD	2-(META-CHLOROPHENYL)-2-(PARA-CHLOROPHENYL)-1,1-DICHLOROETHANE
MPK	METHYLPROPYL KETONE / 2-PENTANONE
MQFH20	MILLI-Q-FILTERED WATER
MSSCAN	GC-MS ORGANIC SCAN
MTRZL	METRAZOL / CARDIAZOLE
NA	SODIUM

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

NAOHME	50% 1M NaOH 50% METHANOL
NAP	NAPHTHALENE
NAPD8	NAPHTHALENED8
NB	NITROBENZENE
NBD5	NITROBENZENE-D5
NBMNSA	N-BUTYL-4-METHYLBENZENESULFONAMIDE
NBUETH	1,1'-OXYBIS [BUTANE] / BUTYL ETHER
NC	NITROCELLULOSE
NCLN	NORTRICYCLANOL
NCPPPA	N-(4-CHLOROPHENYL)-3-PHENYL-2-PROPENAMIDE
NC1	NITROCELLULOSE 12% N
NC2	NITROCELLULOSE 13.4% N
NDHXA	N-NITRODIHEXYLAMINE
NDIOX	NITROGEN DIOXIDE
NDMBSA	N,4-DIMETHYLBENZENESULFONAMIDE
NDNPA	NITROSODI-N-PROPYLAMINE
NECHXA	N-ETHYLCYCLOHEXYLAMINE
NE2PEA	N-ETHYL-2-PROPENAMIDE
NG	NITROGLYCERINE
NHEDCA	N-(2-HYDROXYETHYL)-DECANAMIDE
NH3	AMMONIA
NH3N2	AMMONIA NITROGEN
NI	NICKEL
NIT	NITRITE, NITRATE-NON SPECIFIC
NITARO	NITROAROMATICS
NMANIL	N-METHYLANILINE
NMCANE	N-METHYLCARBAMIC ACID, 1-NAPHTHYL ESTER
NMNSOA	N-METHYL-N-NITROSOANILINE
NNDMA	N,N-DIMETHYLANILINE
NNDMEA	N-NITROSODIMETHYLAMINE
NNDNPA	N-NITROSODI-N-PROPYLAMINE
NNDPA	N-NITROSODIPHENYLAMINE
NNPIPA	N-NITROSOPENTYLISOPENTYLAMINE
NN4HPL	N-NITROSO-4-HYDROXYPROLINE
NO2	NITRITE
NO3	NITRATE
N2KJEL	NITROGEN BY KJELDAHL METHOD
OCADME	OCTANEDIOIC ACID, DIMETHYL ESTER
ODAPDM	OCTADECANOIC ACID, (2-PHENYL-1,3-DIOXOLAN-4-YL)METHYL ESTER
ODECA	OCTADECANOIC ACID / STEARIC ACID
ODMNSX	OCTADECAMETHYLCYCLONONASILOXANE
OEMP	O-ETHYLMETHYL PHOSPHONATE
OILGR	OIL & GREASE
OMCTSX	OCTAMETHYLCYCLOTETRAASILOXANE
OPDDD	2-(ORTHO-CHLOROPHENYL)-2-(PARA-CHLOROPHENYL)-1,1-DICHLOROETHANE
OPDDE	2-(ORTHO-CHLOROPHENYL)-2-(PARA-CHLOROPHENYL)-1,1-DICHLOROETHENE
OPDDT	2-(ORTHO-CHLOROPHENYL)-2-(PARA-CHLOROPHENYL)-1,1,1-TRICHLOROETHANE
OPO4	ORGANOPHOSPHATES
OXAT	1,4-OXATHIANE
OXCN	OXACYCLONONANE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

OZONE	OZONE
PAD4NE	PHOSPHORIC ACID, DIETHYL-4-NITROPHENYL ESTER
PAH	POLYNUCLEAR AROMATIC HYDROCARBON
PAODPE	PHOSPHORIC ACID, OCTYLDIPHENYL ESTER
PARTIC	PARTICULATE MATTER
PATBUE	PROPANOIC ACID, T-BUTYL ESTER
PATPE	PHOSPHORIC ACID, TRIPHENYL ESTER
PA2HDE	PROPANOIC ACID, 2-HYDROXYDECYL ESTER
PA2HBE	PENTANOIC ACID, 2-METHYLBUTYL ESTER
PB	LEAD
PBSTY	LEAD STYPHNATE
PCB016	PCB 1016
PCB221	PCB 1221
PCB232	PCB 1232
PCB242	PCB 1242
PCB248	PCB 1248
PCB254	FCB 1254
PCB260	PCB 1260
PCB262	PCB 1262
PCP	PENTACHLOROPHENOL
PCYMEN	4-(1-METHYLETHYL)TOLUENE / P-CYMENE
PD	DICHLOROPHENYL ARSINE
PDMSLX	POLYDIMETHYL SILOXANE / DIMETHYLPOLY SILOXANE
PEGE	POLYETHYLENEGlyCOL ETHERS
PENAMD	N-PENTAMIDE
PENTAN	PENTANE
PETN	PENTAERYTHRITOL TETRANITRATE
PFP	PENTAFLUOROPHENOL
PH	PH
PHANTR	PHENANTHRENE
PHENAA	PHENYLACETIC ACID
PHEND6	PHENOL-D6
PHENLC	PHENOLICS (NON-SPECIFIC)
PHENOL	PHENOL
PHTHA	1,2-BENZENEDICARBOXYLIC ACID / PHTHALIC ACID
PHTHL	PHTHALATES
PHXAA	PHENOXYACETIC ACID
PHYCP	1,2,3,4,5-PENTAHYDROXYCYCLOPENTANE
PH-F	PH AS TESTED IN THE FIELD (RM, SEMI-QUANT ONLY)
PIPER	PIPERIDINE
POX	PURGEABLE ORGANIC HALOGEN
PO4	PHOSPHATE
PO4ORT	ORTHOPHOSPHATE
PPDDD	2,2-BIS(PARA-CHLOROPHENYL)-1,1-DICHLOROETHANE
PPDDE	2,2-BIS(PARA-CHLOROPHENYL)-1,1-DICHLOROETHENE
PPDDT	2,2-BIS(PARA-CHLOROPHENYL)-1,1,1-TRICHLOROETHANE
PPTDE	2,2-BIS(PARA-CHLOROPHENYL)-2-PHENYL-1,1-DICHLOROETHENE
PRTHN	PARATHION
PYR	PYRENE
PYRD10	PYRENE-D10

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

P4	PHOSPHORUS
RDX	CYCLONITE / HEXAHYDRO-1,3,5-TRINITRO-1,3,4-TRIAZINE
REDDY	RED DYE
RESACI	RESIN ACIDS
S	SULFUR
SB	ANTIMONY
SCN	THIOCYANATE
SE	SELENIUM
SIL	SILICONE
SILVEX	SILVEX
SN	TIN
SO3	SULFITE
SO4	SULFATE
SPIRO	(1',5 TRANS)-7-CHLORO-6-HYDROXY-2',4-DIMETHOXY-6'-METHYL- SPIRO [BENZOFURAN-2-(3H)-1'-(2)-CYCLOHEXENE]-3,4'-DIONE
SQUAL	SQUALENE
SR	STRONTIUM
STERO	STEROIDS
STIGMA	STIGMASTENAL
STYPH	STYPHENATE ION
STYPHA	STYPHENIC ACID
STYR	STYRENE
SUADME	SULFURIC ACID, DIMETHYL ESTER
SULFID	SULFIDE
SUPONA	SUPONA / 2-CHLORO-1-(2,4-DICHLOROPHENYL)VINYLDIETHYL PHOSPHATE
S2CL2	SULFUR MONOCHLORIDE
TBA	TRIBUTYLAMINE
TBASDE	THIOBUTYRIC ACID, S-DECYL ESTER
TBP	TRIBUTYL PHOSPHATE
TCB	TETRACHLOROBENZENES
TCB1	1,2,4,5-TETRACHLOROBENZENE
TCB2	1,2,3,4-TETRACHLOROBENZENE
TCB3	1,2,3,5-TETRACHLOROBENZENE
TCDD	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN / DIOXIN
TCHDCS	TRANS-1,2-CYCLOHEXANDIOL, CYCLIC SULFITE
TCLEA	1,1,2,2-TETRACHLOROETHANE
TCLEE	TETRACHLOROETHYLENE / TETRACHLOROETHENE
TCLTFE	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE
TCOS	TETRACOSANE
TCSAME	15-TETRACOSENOIC ACID, METHYL ESTER
TCST	TRICHLOROSTYRENE
TDGCL	THIODIGLYCOL
TDHMSX	TETRADECAMETHYL HEXASILOXANE
TDODTL	TERT-DODECANETHIOL
TDS	TOTAL DISSOLVED SOLIDS
TEGLME	TRIETHYLENE GLYCOL, METHYL ETHER
TEGLYC	2,2'-[1,2-ETHANEDIYLBIS(OXY)]BIS [ETHANOL] / TRIETHYLENE GLYCOL
TEMP	TEMPERATURE
TEMP-F	TEMPERATURE AS TESTED IN THE FIELD (RM, SEMI-QUANT ONLY)
TEPO4	TRIETHYL PHOSPHATE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

TETPT	TETRACHLOROCYCLOPENTENE
TETR	TETRAZENE
TETRYL	NITRAMINE / N-METHYL-N,2,4,6-TETRANITROANILINE / TETRYL
TFAAPE	TRIFLUOROACETIC ACID, 1,5-PENTANEDIYL ESTER
TFDCLE	1,1,2-TRIFLUORO-1,2-DICHLOROETHANE
TGLYME	TETRAGLYME
THF	TETRAHYDROFURAN
THP2ML	TETRAHYDROPYRANYL-2-METHANOL
TL	THALLIUM
TMHPDO	3,3,6-TRIMETHYL-1,5-HEPTADIEN-4-ONE
TMHXL	3,5,5-TRIMETHYL-1-HEXANOL
THODEO	2,2,7,7-TETRAMETHYL-4,5-OCTADIEN-3-ONE
TMPHAN	TETRAMETHYLPHENANTHRENE
TMPO3	TRIMETHYL PHOSPHITE
TMPO4	TRIMETHYL PHOSPHATE
TMTCON	3,5,24-TRIMETHYLTETRACONTANE
TMUR	TETRAMETHYLUREA
TM3PL	2,3,4-TRIMETHYL-3-PENTANOL
TNBISO	TRINITROBENZENE ISOMER
TNTISO	TRINITROTOLUENE ISOMER
TOC	TOTAL ORGANIC CARBON
TOTDDT	TOTAL VALUE OF ALL DDT, DDE, DDD ISOMERS
TOTGAF	TOTAL GRAVIMETRIC, ACID FRACTION
TOTHG2	TOTAL MERCURY
TOTPCB	TOTAL PCB
TOX	TOTAL ORGANIC HALOGENS
TPH	THIOPHENE
TPO4	TOTAL PHOSPHATES
TRCLE	TRICHLOROETHYLENE / TRICHLOROETHENE
TRIBZ	TRICHLOROBENZENES
TRIMBZ	TRIMETHYLBENZENES
TRIPT	TRICHLOROCYCLOPENTENE
TRMTDE	2,3,4-TRIMETHYL-4-TETRADECENE
TRPHEN	TRIPHENYLENE
TRXMET	TRIHALOMETHANES
TS	TOTAL SULFUR
TSAPHE	P-TOLUENESULFONIC ACID, HEPTYL ESTER
TSS	TOTAL SUSPENDED SOLIDS
TVS	TOTAL VOLATILE SOLIDS
TXPHEN	TOXAPHENE
T1B2BC	TRANS-1-BROMO-2-BUTYLCYCLOPROPANE
T12DCE	TRANS-1,2-DICHLOROETHENE / TRANS-1,2-DICHLOROETHYLENE
T13DCP	TRANS-1,3-DICHLOROPROPENE
T2DEC	TRANS-2-DECENE
UDMH	UNSYMMETRICAL DIMETHYL HYDRAZINE
UNKXXX	UNKNOWN COMPOUND 001 THRU 999. NOTE: 001-999 FULL FIELD AS SHOWN
V	VANADIUM
VARHY	VARIOUS HYDROCARBONS WITH INCREASING M.W.
VFA	VINYL FORMATE
VM	O-ETHYL-S-(2-DIETHYLAMINOETHYL)METHYL PHOSPHONOTHIOLATE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

VX	O-ETHYL-S-(2-DIISOPROPYLAMINOETHYL)METHYL PHOSPHONOTHIOLATE
WP	WHITE PHOSPHORUS
XPLOSV	EXPLOSIVE SPRAY
XYLEN	XYLENES
YELDY	YELLOW DYE
ZN	ZINC
ZR	ZIRCONIUM
01NHCL	0.1 N HYDROCHLORIC ACID
1A3MPZ	1-ACETYL-3-METHYL-5-PYRAZOLONE
1BY4HB	1-BENZYL-4-HYDROXYBENZIMIDAZOLE
1CDMPZ	1-CARBAHOYL3,5-DIMETHYL-2-PYRAZOLINE
1CLODC	1-CHLOROOCATADECANE
1C4L	1-BUTANOL
1DODCL	1-DODECANOL
1EHB	1-ETHYLHEXYLBENZENE
1EPB	1-ETHYLPROPYLBENZENE
1E2MB	1-ETHYL-2-METHYLBENZENE
1E24DB	1-ETHYL-2,4DIMETHYLBENZENE
1FNAP	1-FLUORONAPHTHALENE
1HPDOL	1-HEPTADECANOL
1HXE	1-HEXENE
1HX3OL	1-HEXEN-3-OL
1MBAAN	1-METHYLBENZ (A) ANTHRACENE
1MCPNE	1-METHYLCYCLOPENTENE
1MDB	1-METHYLDECYLBENZENE
1MECHX	1-METHYLETHYLCYCLOHEXANE
1MEIND	1-METHYLINDAN
1MFLRE	1-METHYL-9HFLUORENE
1MNAP	1-METHYLNAPHTHALENE
1MNB	1-METHYLNONYLBENZENE
1MPYR	1-METHYLPYRENE
1MX1PE	1-METHOXY-1PROPENE
1M2PEC	1-METHYL-2-(2-PROPENYL) CYCLOPENTANE
1M7MEN	1-METHYL-7-(1-METHYLETHYL) NAPHTHALENE
1NHP	1-NITROHEPTANE
1NKCL	1.0N KCL SOLUTION
1N2ONE	1-NITRO-2-OCTANONE
1OCTOL	1-OCTANOL
1PECHX	1-PROPENYLCYCLOHEXANE
1PNAP	1-PHENYLNAPHTHALENE
1TBCHA	1-T-BUTYLCYCLOHEXANECARBOXYLIC ACID
10MEOH	10% METHANOL
10MUDM	10-METHYLUDECANOIC ACID, METHYL ESTER
10OEME	10-OCTADECENOIC ACID, METHYL ESTER
11DCE	1,1-DICHLOROETHYLENE / 1,1-DICHLOROETHENE
11DCLE	1,1-DICHLOROETHANE
111TCE	1,1,1-TRICHLOROETHANE
112TCE	1,1,2-TRICHLOROETHANE
113MCH	1,1,3-TRIMETHYLCYCLOHEXANE
12DBD4	1,2-DICHLOROBENZENE-D4

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

12DCD4	1,2-DICHLOROETHANE-D4
12DCLB	1,2-DICHLOROBENZENE
12DCLE	1,2-DICHLOROETHANE
12DCLP	1,2-DICHLOROPROPANE
12DMB	1,2-DIMETHYLBENZENE / O-XYLENE
12DNAP	1,2-DIMETHYLNAPHTHALENE
12DPB	1,2-DIPHENYLBENZENE
12DPH	1,2-DIPHENYLHYDRAZINE
12EPCH	CYCLOHEXENE OXIDE / 1,2-EPOXYCYCLOHEXENE
12EPEB	1,2-EPOXYETHYLBENZENE / STYRENE OXIDE
12MTDM	12-METHYLTETRADECANOIC ACID, METHYL ESTER
12TMCP	1,1,2,2-TETRAMETHYLCYCLOPROPANE
123CPR	1,2,3-TRICHLOROPROPANE
123MCH	1,2,3-TRIMETHYLCYCLOHEXANE
123TCB	1,2,3-TRICHLOROBENZENE
1234MB	1,2,3,4-TETRAMETHYLBENZENE
124MCH	1,2,4-TRIMETHYLCYCLOHEXANE
124TCB	1,2,4-TRICHLOROBENZENE
13CPDO	1,3-CYCLOPENTADIONE
13BD4	1,3-DICHLOROBENZENE-D4
13DCLB	1,3-DICHLOROBENZENE
13DCPE	1,3-DICHLOROPROPENE
13DEB	1,3-DIETHYLBENZENE
13DFB	1,3-DIFLUOROBENZENE
13DMB	1,3-DIMETHYLBENZENE / M-XYLENE
13DMBB	(1,3-DIMETHYLBUTYL) BENZENE
13DMCH	1,3-DIMETHYLCYCLOHEXANE
13DNAP	1,3-DIMETHYLNAPHTHALENE
13DNB	1,3-DINITROBENZENE
13DPPR	1,1'-(1,3-PROPANEDIYL) BIS [BENZENE] / 1,3-DIPHENYLPROPANE
13TDAM	13-TETRADECYNOIC ACID, METHYL ESTER
135MCH	1,3,5-TRIMETHYLCYCLOHEXANE
135TMB	1,3,5-TRIMETHYLBENZENE
135TNB	1,3,5-TRINITROBENZENE
14DCBU	1,4-DICHLOROBUTANE
14DCLB	1,4-DICHLOROBENZENE
14DFB	1,4-DIFLUOROBENZENE
14DIOX	1,4-DIOXANE
14DMCH	1,4-DIMETHYLCYCLOHEXANE
14DMNP	1,4-DIHYDRO1,4-METHANONAPHTHALENE
14DMAA	1,4-DIMETHOXYANTHRACENE
14DNB	1,4-DINITROBENZENE
14D2EB	1,4-DIMETHYL-2-ETHYLBENZENE
14MPME	14-METHYLPENTADECANIC ACID, METHYL ESTER
15DNAP	1,5-DIMETHYLNAPHTHALENE
15MHME	15-METHYLHEXADECANOIC ACID, METHYL ESTER
16DMIN	1,6-DIMETHYLINDAN
16DNAP	1,6-DIMETHYLNAPHTHALENE
16MHME	16-METHYLHEPTADECANOIC ACID, METHYL ESTER
167TMN	1,6,7-TRIMETHYLNAPHTHALENE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

17PTCE	17-PENTATRIACONTENE
18DNAP	1,8-DIMETHYLNAPHTHALENE
18018D	1,2,3,4,4A,5,8,8A-OCTAHYDRO-1,4,5,8-DIMETHANOLNAPHTHALEN-2-OL
2A46DA	2-AMINO-4,6DINITROANILINE
2A46DT	2-AMINO-4,6DINITROTOLUENE
2BEETO	2-(2-N-BUTOXYETHOXY)ETHANOL
2BEMDE	2,2-BIS(ETHYLMERCAPTO)DIETHYL ETHER
2BMMPR	2,2-BIS(METHYLMERCAPTO)PROPANE
2BNMMN	2-BUTYL-N-METHYLNORLEUCINE, METHYL ESTER
2BRHXA	2-BROMOHEXANOIC ACID
2BUXEL	2-BUTOXYETHANOL
2B1CP	2-BROMO-1-CHLOROPROPANE
2B10OL	2-BUTYL-1-OCTANOL
2B4MFU	2-(1-BUTYL)4-METHYLFURAN
2CBMN	O-CHLOROBENZYLIDINEMALONONITRILE
2CECHO	2-(2-CYANOETHYL)CYCLOHEXANONE
2CHAE	2-CYCLOPENTENE-1-HENDECANOIC ACID, ETHYL ESTER
2CHE1L	2-CYCLOHEXEN-1-OL
2CHE1O	2-CYCLOHEXEN-1-ONE
2CLBP	2-CHLOROBIPHENYL
2CLEVE	(2-CHLOROETHOXY)ETHENE / 2-CHLOROETHYL VINYL ETHER
2CLP	2-CHLOROPHENOL
2CLPD4	2-CHLOROPHENOL-D4
2CMCHO	2-(CYANOMETHYL)CYCLOHEXANONE
2CNAP	2-CHLORONAPHTHALENE
2C4E	E-BUTENE
2C6MPZ	2-CHLORO-6-METHOXY-10H-PHENOTHIAZINE
2DMPEN	2,2-DIMETHYLPENTANE
2ECYBL	2-ETHYLCYCLOBUTANOL
2EP	2-ETHYLPHENOL
2E1HXL	2-ETHYL-1-HEXANOL
2E2HPD	2-ETHYL-2-HYDROXYMETHYL-1,3-PROPANEDIOL
2E4MPL	2-ETHYL-4-METHYL-1-PENTANOL
2FBP	2-FLUOROBIPHENYL
2FNAP	2-FLUORONAPHTHALENE
2FP	2-FLUOROPHENOL
2HBDDM	2-HYDROXYBUTANEDIOIC ACID, DIMETHYL ESTER
2HBNZL	2-HYDROXYBENZALDEHYDE / SALICYLALDEHYDE
2HNDOL	2-HENDECANOL / 2-UNDECANOL
2HYBP	2-HYDROXYBIPHENYL
2MBZA	2-METHYLBENZYL ALCOHOL
2MCPNE	2-METHYLCYCLOPENTANONE
2MCYPL	2-METHYLCYCLOPENTANOL
2MC3	2-METHYLPROPANE / ISOBUTANE
2MC4	2-METHYLBUTANE/ISOPENTANE
2MC7	2-METHYLHEPTANE / ISOCTANE
2MDEC	2-METHYLDECANE
2MDOD	2-METHYLDODECANE
2MENAP	2-(1-METHYLETHYL)NAPHTHALENE
2MEPEN	2-METHYLPENTANE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

2MMECO	2-METHYL-5-(1-METHYLETHYL)-2-CYCLOHEXEN-1-ONE
2MNAP	2-METHYLNAPHTHALENE
2MP	2-METHYL PHENOL / 2-CRESOL
2MPAHT	2-METHYLPROPANOIC ACID, 3-HYDROXY-2,4,4-TRIMETHYLPENTYL ESTER
2MPAME	2-METHYLPROPANOIC ACID, METHYL ESTER
2MPAIE	2-METHYLPROPANOIC ACID, 1-(1,1-DIMETHYLETHYL)-2-METHYL-1,3-PROPANEDIYL ESTER
2MPEAE	2-METHYL-2-PROPENOIC ACID, 1,2-ETHANEDIYLESTER
2MPYR	2-METHYLPYRENE
2MTETD	2-METHYLTETRADECANE
2MTHF	2-METHYLTETRAHYDROFURAN
2MTHPM	2-METHYLTHIO-4-HYDROXYPYRIMIDINE
2MXEXL	2-(2-METHOXYETHOXY)ETHANOL / DIETHYLENEGLYCOL MONOMETHYLETHER
2MXMC3	2-METHOXY-2-METHYLPROPANE / TERT-BUTYLMETHYL ETHER
2MXTMB	2-METHOXY-2,3,3-TRIMETHYLBUTANE
2MX1PE	2-METHOXY-1PROPENE
2M1DDL	2-METHYL-1-DODECANOL
2M1PNE	2-METHYL-1-PENTENE
2M2BDA	2-METHYL-2-BUTENEDIAMIDE
2M2C3L	2-METHYL-2-PROPANOL / TERT-BUTANOL
2M2H3B	2-METHYL-2-HYDROXY-3-BUTYNE
2M24P	2-METHYL-2,4-PENTANEDIOL
2M3HXE	2-METHYL-3-HEXENE
2M3PNO	2-METHYL-3-PENTANONE
2NBZLZ	2-NITROBENZALAZINE
2NKCL	2N POTASSIUM CHLORIDE SOLUTION
2NNDPA	2-NITRO-N-NITROSODIPHENYLAMINE
2NODCO	2-NONADECANONE
2NP	2-NITROPHENOL
2NT	2-NITROTOLUENE
2N3C	3-METHYL-2-NITROPHENOL / 2-NITRO-M-CRESOL
2OXBEL	2,2-OXY-BIS [ETHANOL]
2PETOH	2-PHENYLETHANOL
2PHXEL	2-PHENOXYETHANOL
2PNAP	2-PHENYLNAPHTHALENE
2PROL	2-PROPANOL
2PXEXL	2-(2-PHENOXYETHOXY)ETHANOL
2TCLEA	1,1,1,2-TETRACHLOROETHANE
2TMHPD	2,6,10,14-TETRAMETHYLHEPTADECANE
2TMPD	2,6,10,14-TETRAMETHYLPENTADECANE
210DMU	2,10-DIMETHYLUDECANE
225TCB	2,2',5-TRICHLOROBIPHENYL
2255CB	2,2',5,5'-TETRACHLOROBIPHENYL
226TMO	2,2,6-TRIMETHYLOCTANE
23DCLP	2,3-DICHLOROPHENOL
23DMP	2,3-DIMETHYLPHENOL
23DNAP	2,3-DIMETHYLNAPHTHALENE
23D2HL	2,3-DIMETHYL-2-HEXANOL
23TMP	2,2,3,3-TETRAMETHYLPENTANE
2345CB	2,3,4,5-TETRACHLOROBIPHENYL

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

2346CP	2,3,4,6-TETRACHLOROPHENOL
235TMD	2,3,5-TRIMETHYLDECANE
2356CP	2,3,5,6-TETRACHLOROPHENOL
236TMN	2,3,6-TRIMETHYLNAPHTHALENE
237TMO	2,3,7-TRIMETHYLOCTANE
24D	2,4-DICHLOROPHENOXYACETIC ACID
24DCB	2,4'-DICHLOROBIPHENYL
24DCLP	2,4-DICHLOROPHENOL
24DMD	2,4-DIMETHYLDECANE
24DMHX	2,4-DIMETHYLHEXANE
24DMPN	2,4-DIMETHYLPHENOL
24DNP	2,4-DINITROPHENOL
24DNT	2,4-DINITROTOLUENE
24M2PL	2,4-DIMETHYL-2-PENTANOL
24NPD3	2,4-DINITROPHENOL-D3
24T13P	2,2,4-TRIMETHYL-1,3-PENTANEDIOL
245PCB	2,2',4,5,5'-PENTACHLOROBIPHENYL
245T	2,4,5-TRICHLOROPHENOXYACETIC ACID
245TCP	2,4,5-TRICHLOROPHENOL
246MPY	2,4,6-METHYLPYRIDINE
246TCA	2,4,6-TRICHLOROANILINE
246TCP	2,4,6-TRICHLOROPHENOL
246TMO	2,4,6-TRIMETHYLOCTANE
246TNP	2,4,6-TRINITROPHENOL / PICRIC ACID
246TNR	2,4,6-TRINITRORESORCINOL / STYPNIC ACID
246TNT	2,4,6-TRINITROTOLUENE
247HOI	2,2,4,4,7,7HEXAMETHYLOCTAHYDRO-1H-INDENE
247TMO	2,4,7-TRIMETHYLOCTANE
25C14D	2,5-CYCLOHEXADIEN-1,4-DIONE
25DCLP	2,5-DICHLOROPHENOL
25DMP	2,5-DIMETHYLPHENOL
25DMPA	2,5-DIMETHYLPHENANTHRENE
25DTHF	2,5-DIMETHYLTETRAHYDROFURAN
25HPCB	2,2',3,4,5,5',6-HEPTACHLOROBIPHENYL
25HXC	2,2',3,4,5,5'-HEXACHLOROBIPHENYL
25OCCB	2,2',3,3',4,4',5,5'-OCTACHLOROBIPHENYL
256TMD	2,5,6-TRIMETHYLDECANE
26DBMP	2,6-DI-T-BUTYL-4-METHYLPHENOL
26DCLP	2,6-DICHLOROPHENOL
26DMO	2,6-DIMETHYLOCTANE
26DMP	2,6-DIMETHYLPHENOL
26DMST	2,6-DIMETHYLSTYRENE
26DMUD	2,6-DIMETHYLUNDECANE
26DNA	2,6-DINITROANILINE
26DNT	2,6-DINITROTOLUENE
26HPCB	2,2',3,4,4',5,6-HEPTACHLOROBIPHENYL
2611MD	2,6,11-TRIMETHYLDODECANE
27DMO	2,7-DIMETHYLOCTANE
27DNAP	2,7-DIMETHYLNAPHTHALENE
29DMUD	2,9-DIMETHYLUNDECANE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

3BPETH	3-BUTENYLPENTYL ETHER
3CHXD	3-CYCLOHEXYLDECANE
3CLP	3-CHLOROPHENOL
3CMCH	3-(CHLOROMETHYL)CYCLOHEXENE
3DCHEO	3,5-DIMETHYL-2-CYCLOHEXEN-1-ONE
3EEBOD	3-ETHYL-5-(2-ETHYLBUTYL)OCTADECANE
3EE2BO	3,4-EPOXY-3ETHYL-2-BUTANONE
3EHXDE	3-ETHYL-1,4HEXADIENE
3EP	3-ETHYLPHENOL
3E22MP	3-ETHYL-2,2DIMETHYLPENTANE / 3-(T-BUTYL)-PENTANE
3E25DH	3-ETHYL-2,5DIMETHYL-3-HEXENE
3HDMPL	3-(HYDROXYMETHYL)-4,4-DIMETHYLPENTANAL
3HDMPT	3-HYDROXY-2,7-DIMETHYL-4-[3H]-PTERIDINONE
3HXE2O	3-HEXEN-2-ONE
3MBP	3-METHYLBIPHENYL
3MCHRY	3-METHYLCHRYSENE
3MEPEN	3-METHYLPENTANE
3MP	3-METHYLPHENOL / 3-CRESOL
3MPANR	3-METHYLPHENANTHRENE
3MUND	3-METHYLUNDECANE
3MXIMZ	3-METHOXYIMIDAZOLE
3MXT	3-METHOXYTOLUENE
3M1PL	3-METHYL-1-PENTANOL
3M2CHO	3-METHYL-2-CYCLOHEXEN-1-ONE
3M2C1O	3-METHOXY-2CYCLOPENTEN-1-ONE
3M2C5E	3-METHYL-2-PENTENE
3M2HEO	3-METHYL-2-CYCLOHEXEN-1-ONE
3M2HXL	3-METHYL-2-HEXANOL
3M5PNN	3-METHYL-5-PROPYLNONANE
3NT	3-NITROTOLUENE
3OCTOL	3-OCTANOL
3OPPAE	3-OXO-3-PHENYLPROPANOIC ACID, ETHYL ESTER
3PC3AC	3-PHENYLPROPANOYL CHLORIDE/HYDRPCINNAMYL CHLORIDE
3PT	3-PROPYLTOLUENE
3S5E3L	(3BETA)-STIGMAST-5-EN-3-OL
3TBUP	3-(T-BUTYL)PHENOL
3TCHEO	3,5,5-TRIMETHYL-2-CYCLOHEXEN-1-ONE
33DCBD	3,3'-DICHLOROBENZIDINE
33DMHX	3,3-DIMETHYLHEXANE
33DMPN	3,3-DIMETHYLPENTANE
34CBD6	3,3',4,4'-TETRACHLOROBIPHENYL-D6
34DCLP	3,4-DICHLOROPHENOL
34DMP	3,4-DIMETHYLPHENOL
34D1DE	3,4-DIMETHYL-1-DECENE
344TPE	3,4,4-TRIMETHYL-2-PENTENE
345T1H	3,4,5-TRIMETHYL-1-HEXENE
35DMP	3,5-DIMETHYLPHENOL
35DNA	3,5-DINITROANILINE
35DNP	3,5-DINITROPHENOL
35DNT	3,5-DINITROTOLUENE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

35M3HL	3,5-DIMETHYL-3-HEXANOL
36DF90	3,6-DICHLOROFLUOREN-9-ONE
36TMPA	3,4,5,6-TETRAMETHYLPHENANTHRENE
37DMNN	3,7-DIMETHYLNONANE
38DMUD	3,8-DIMETHYLUNDECANE
4AMORP	4-ACETYLMORPHOLINE
4A35DT	4-AMINO-3,5DINITROTOLUENE
4BFB	4-BROMOFLUOROBENZENE
4BRPPE	4-BROMOPHENYLPHENYL ETHER
4B3P20	4-BUTOXY-3-PENTEN-2-ONE
4CCHXL	4-CHLOROCYCLOHEXANOL
4CLPPE	4-CHLOROPHENYLPHENYL ETHER
4CL2C	2-METHYL-4-CHLOROPHENOL / 4-CHLORO-2-CRESOL
4CL3C	3-METHYL-4-CHLOROPHENOL / 4-CHLORO-M-CRESOL / 4-CHLORO-3-CRESOL
4C3MBE	4-CHLORO-3-METHYL-1-BUTENE
4DM2PL	4,4-DIMETHYL-2-PENTANOL
4ETMHP	4-ETHYL-2,2,6,6-TETRAMETHYLHEPTANE
4E2OCE	4-ETHYL-2-OCTENE
4FANIL	4-FLUOROANILINE
4FT	4-FLUOROTOLUENE
4HAZOB	4-HYDROXYAZOBENZENE
4HYBA	4-HYDROXYBENZALDEHYDE
4H3MBA	4-HYDROXY-3METHOXYBENZALDEHYDE / VANILLIN
4H35BA	4-HYDROXY-3,5-DIMETHOXYBENZALDEHYDE
4IOMQU	4-IODOMETHYLQUINULCIDINE
4MBP	4-METHYLBIPHENYL
4MBSA	4-METHYLBENZENE SULFONAMIDE
4MC7	4-METHYLHEPTANE
4MDBFU	4-METHYLDIBENZOFURAN
4MENPA	4-(1-METHYLETHYL)-N-PHENYLANILINE
4MFLRE	4-METHYL-9HFLUORENE
4MMBHE	4-METHYL-1-(1-METHYLETHYL)-BICYCLO [3.1.0] HEX-2-ENE
4MP	4-METHYLPHENOL / 4-CRESOL
4MPANR	4-METHYLPHENANTHRENE
4MPYR	4-METHYLPYRENE
4MXCHL	4-METHOXYCYCLOHEXANOL
4MXP	4-METHOXYPHENOL
4M2PPL	4-METHYL-2-PROPYL-1-PENTANOL
4NANIL	4-NITROANILINE
4NP	4-NITROPHENOL
4TBU2C	2-METHYL-4-(T-BUTYL)PHENOL / 4-T-BUTYL-2-CRESOL
4TOP	4-T-OCTYLPHENOL
41MEHP	4-(1-METHYLETHYL)HEPTANE
44DFB2	4,4-DIFLUOROBENZOPHENONE
44DMPE	4,4-DIMETHYL-2-PENTENE
44DMUD	4,4-DIMETHYLUNDECANE
46DN2C	2-METHYL-4,6-DINITROPHENOL / 4,6-DINITRO-2-CRESOL
468T1N	4,6,8-TRIMETHYL-1-NONENE
47DMUD	4,7-DIMETHYLUNDECANE
48DMHD	4,8-DIMETHYLHENDECANE

*** FIELD DEFINITIONS ***

*** TEST-NAME ***

5CL2C	5-CHLORO-0-CRESOL / 2-METHYL-5-CHLOROPHENOL
5E2MHP	5-ETHYL-2-METHYLHEPTANE
5E5MD	5-ETHYL-5-METHYLDECANE
5M2HXO	5-METHYL-2-HEXANONE
5M5HAL	5-METHYL-5-HYDROXYHEXANOIC ACID LACTONE
5N2OL	5-NORBOREN-2-OL
5PTRID	5-PROPYLTRIDECAE
50H50A	50%HEXANE-50%ACETONE
50M50A	50% METHYLENE CHLORIDE-50% ACETONE
50WMAN	50%WATER-25%METHANOL-25%ACETONITRILE
6CL3C	3-METHYL-6-CHLOROPHENOL / 6-CHLORO-3-CRESOL
6E6MFV	6-ETHYL-6-METHYLFULVENE
6MEPUR	6-METHYLPURINE
6MTRID	6-METHYLTRIDECAE
6M3HPL	6-METHYL-3-HEPTANOL
6TBU2C	2-METHYL-6-(T-BUTYL)PHENOL / 6-T-BUTYL-2-CRESOL
7MTRID	7-METHYLTRIDECAE
8MNNDL	8-METHYL-1,8-NONANEDIOL
9FLENO	9-FLUORENONE
9MBAAN	9-METHYLBENZ [A] ANTHRACENE
9MXANT	9-METHOXYANTHRACENE

ALPHABETIC SORT BY TEST-NAMES:

ANAPNE	ACENAPHTHENE
ANAPYL	ACENAPHTHYLENE
AACHXE	ACETIC ACID, CYCLOHEXYL ESTER
C2AVE	ACETIC ACID, VINYL ESTER / VINYL ACETATE
ACET	ACETONE
CH3CN	ACETONITRILE
ACPHN	ACETOPHENONE
ACIDIT	ACIDITY
ACDHMW	ACIDS (HIGH MOLECULAR WEIGHT)
ACROLN	ACROLEIN
ACRYLO	ACRYLONITRILE
DM	ADAMSITE
ALHMW	ALCOHOLS (HIGH MOLECULAR WEIGHT)
ALDEHY	ALDEHYDES
ALDRN	ALDRIN
ALAL	ALIPHATIC ALCOHOL
ALHC	ALIPHATIC HYDROCARBON
ALK	ALKALINITY
ALKBIC	ALKALINITY BICARBONATE
ALKCAR	ALKALINITY CARBONATE
ALKHYD	ALKALINITY HYDROXIDE
ALKN	ALKANE
AYLETH	ALLYL ETHER
ABHC	ALPHA-BENZENEHEXACHLORIDE / ALPHA-HEXACHLOROCYCLOHEXANE

LISTING OF METHODS TABLE FOR EA ENGINEERING
(LISTING OF \IRSCC\METHODS.DBF USING \DBASE\METHTAB.FRM)

LAB METH NUM	METHOD NAME	MED UNI IA TS	CER Y	CERTDATE LVL	CERTIFIED REPORTING LIMIT	MAXIMUM TEST POSSIBLE NAME CONC	QC NM	QC HIGH MAN	QC HIGH EXP	QC LOW MAN	QC LOW EXP
ET 99	METALS/SOIL/CVAA	SO UGG	99	01/01/85	0.000000	0.0000	N	0.00	0	0.00	0
ET J802	METALS/SOIL/GFAA	SO UGG	C1	09/29/86	0.220000	2.0000 HG	Y	4.50	-1	9.00	-2
ET J804	METALS/SOIL/GFAA	SO UGG	C1	09/29/86	0.007000	0.2000 AG	Y	1.00	-1	1.00	-2
ET J804	METALS/SOIL/GFAA	SO UGG	C1	09/29/86	0.042000	1.0000 BE	Y	2.50	-1	5.00	-2
ET J804	METALS/SOIL/GFAA	SO UGG	C1	09/29/86	0.075000	1.0000 PB	Y	7.50	-1	1.50	-1
ET J804	METALS/SOIL/GFAA	SO UGG	C1	09/29/86	0.350000	2.5000 SB	Y	2.50	0	4.50	-1
ET J804	METALS/SOIL/GFAA	SO UGG	C1	09/29/86	0.085000	1.0000 TL	Y	7.50	-1	1.50	-1
ET J801	METALS/SOIL/HYAA	SO UGG	C1	09/29/86	0.120000	2.0000 AS	Y	1.00	0	2.00	-1
ET J801	METALS/SOIL/HYAA	SO UGG	C1	09/29/86	0.130000	2.5000 SE	Y	2.00	0	2.00	-1
ET J802	METALS/SOIL/ICPLASMA	SO UGG	C1	11/23/86	0.170000	10.0000 BA	Y	2.50	0	2.50	-1
ET J802	METALS/SOIL/ICPLASMA	SO UGG	C1	11/23/86	0.600000	50.0000 CD	Y	1.00	1	1.00	0
ET J802	METALS/SOIL/ICPLASMA	SO UGG	C1	11/23/86	0.540000	45.0000 CR	Y	5.00	0	1.00	0
ET J802	METALS/SOIL/ICPLASMA	SO UGG	C1	11/23/86	1.100000	100.0000 CU	Y	1.00	1	2.00	0
ET J802	METALS/SOIL/ICPLASMA	SO UGG	C1	11/23/86	3.300000	20.0000 NI	Y	1.90	1	3.80	0
ET J802	METALS/SOIL/ICPLASMA	SO UGG	C1	11/23/86	0.720000	35.0000 ZN	Y	5.00	0	1.00	0
ET K801	ANIONS/SOIL/TECHNICON	SO UGG	C1	10/07/86	11.100000	40.0000 NIT	Y	0.00	0	0.00	0
ET K803	ANIONS/SOIL/TECHNICON	SO UGG	C1	04/16/87	0.148000	2.0000 CYN	Y	1.50	0	3.00	-1
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.008680	0.0400 ABHC	N	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.009740	0.0400 ALDRN	Y	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.002480	0.0800 DLDNRN	Y	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.002370	0.0800 ENDNRN	Y	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.008630	0.0400 HPCL	N	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.007370	0.0400 LIN	Y	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.026500	0.2400 MLTHN	N	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.052000	0.4000 PC8016	Y	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.067500	0.8000 PC8260	Y	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.004840	0.0800 PPDD	N	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.002000	0.0800 PPDE	N	0.00	0	0.00	0
ET L801	PESTICIDES/SOIL/8CEC	SO UGG	C1	01/14/87	0.002510	0.0800 PPDDT	Y	0.00	0	0.00	0
ET L801	VOLATILES/SOIL/8CMS	SO UGG	1A	11/26/86	1.030000	20.0000 12DC24	Y	0.00	0	0.00	0
ET L801	VOLATILES/SOIL/8CMS	SO UGG	1A	11/26/86	0.226000	50.0000 48FBD2	Y	0.00	0	0.00	0
ET L801	VOLATILES/SOIL/8CMS	SO UGG	1A	11/26/86	0.900000	50.0000 CD2CL2	Y	0.00	0	0.00	0
ET L801	VOLATILES/SOIL/8CMS	SO UGG	1A	11/26/86	0.095000	50.0000 ET8D10	Y	0.00	0	0.00	0
ET L801	VOLATILES/SOIL/8CMS	SO UGG	1A	11/26/86	0.998000	50.0000 MEC5D8	Y	0.00	0	0.00	0
ET L801	VOLATILES/SOIL/8CMS	SO UGG	1A	11/26/86	0.140000	50.0000 TRCLE	Y	0.00	0	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	2.300000	50.0000 12D5D4	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	6.700000	50.0000 246T8P	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	2.600000	20.0000 2CLPD4	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	2.100000	50.0000 2F8P	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	2.800000	50.0000 2F8P	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	0.830000	20.0000 DEPL4	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	8.200000	50.0000 DNDPD4	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	3.200000	50.0000 NBD5	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	2.500000	20.0000 PHEND6	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	3.300000	50.0000 TSPD14	Y	1.00	1	0.00	0
ET L801	ORGANICS/SOIL/8CMS	SO UGG	1A	01/06/87	0.300000	50.0000 135T8B	Y	0.00	0	0.00	0
ET L801	ORGANONITRATES/SOIL/8CMS	SO UGG	C1	09/15/86	0.830000	5.0000 132NB	Y	0.00	0	0.00	0
ET L801	ORGANONITRATES/SOIL/8CMS	SO UGG	C1	09/15/86	0.500000	20.0000 245TNT	Y	0.00	0	0.00	0
ET L801	ORGANONITRATES/SOIL/8CMS	SO UGG	C1	09/15/86	3.400000	10.0000 24CNT	Y	0.00	0	0.00	0

LISTING OF METHODS TABLE FOR EA ENGINEERING
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LAB METH NUM	METHOD NAME	MED UNI IA TS	CER T LVL	CERTIFIED REPORTING LIMIT	MAXIMUM TEST POSSIBLE NAME CONC	QC NM	QC HIGH MAN	QC HIGH EXP	QC LOW MAN	QC LOW EXP
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	2.300000	200.0000 13DBD4	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	34.600000	200.0000 246TBP	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	2.200000	200.0000 2CLPD4	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	1.800000	100.0000 2FBP	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	1.100000	20.0000 2FP	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	32.200000	200.0000 DEPD4	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	2.500000	200.0000 DNOPD4	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	6.400000	100.0000 NBD5	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	3.900000	200.0000 PHEND6	Y	1.00	2	0.00	0
ET UM02	ORGANICS/WATER/GCMS	WA UGL	1A 10/20/86	7.400000	100.0000 TRPD14	Y	1.00	2	0.00	0
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	5.840000	100.0000 13STNB	Y	0.00	0	0.00	0
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	9.080000	80.0000 13DNB	Y	4.00	1	8.00	0
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	6.250000	100.0000 246TNT	Y	0.00	0	0.00	0
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	2.220000	20.0000 24DNT	Y	0.00	0	0.00	0
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	5.700000	80.0000 26DNT	Y	4.00	1	8.00	0
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	5.070000	200.0000 HMX	Y	1.00	2	2.00	1
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 08/05/87	6.500000	20.0000 NB	Y	0.00	0	0.00	0
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	4.190000	160.0000 RDX	Y	8.00	1	1.40	1
ET UM02	ORGANONITRATE/WATER/HPLC	WA UGL	C1 11/18/86	4.390000	80.0000 TETRVL	Y	4.00	1	8.00	0
ET UM03	ORGANOBULFURS/WATER/HPLC	WA UGL	C1 12/12/86	720.000000	16000.0000 TDBCL	Y	7.00	3	1.40	3

LISTING OF METHODS TABLE FOR EA ENGINEERING
(LISTING OF \IRSCC\METHODS.DBF USING \DBASE\METHTAB.FRM)

LAB METH NUM	METHOD NAME	MED TA	UNIT TS	CER T	CERTIFICATE DATE	CERTIFIED REPORTING LIMIT	MAXIMUM TEST POSSIBLE NAME CONC	QC NM	QC HIGH MAN	QC HIGH EXP	QC LOW MAN	QC LOW EXP
ET LW01	ORGANONITRATES/SOIL/HPLC	SO	UGG	C1	09/15/86	0.540000	5.0000 26DNT	Y	0.00	0	0.00	0
ET LW01	ORGANONITRATES/SOIL/HPLC	SO	UGG	C1	09/15/86	9.200000	40.0000 HMX	Y	0.00	0	0.00	0
ET LW01	ORGANONITRATES/SOIL/HPLC	SO	UGG	C1	09/15/86	9.200000	40.0000 NB	Y	0.00	0	0.00	0
ET LW01	ORGANONITRATES/SOIL/HPLC	SO	UGG	C1	01/05/87	6.690000	200.0000 RDX	Y	0.00	0	0.00	0
ET LW01	ORGANONITRATES/SOIL/HPLC	SO	UGG	C1	08/06/87	2.810000	10.0000 TETRYL	Y	0.00	0	0.00	0
ET SB02	METALS/WATER/CVAA	WA	UGL	C1	09/29/86	1.100000	10.0000 HG	Y	5.00	0	2.00	0
ET SC01	METALS/WATER/AAS	WA	UGL	C1	09/23/86	450.000000	4000.0000 NA	Y	4.00	3	1.00	3
ET SD04	METALS/WATER/GFAA	WA	UGL	C1	09/29/86	0.140000	4.0000 AG	Y	1.40	0	2.80	-1
ET SD04	METALS/WATER/GFAA	WA	UGL	C1	09/29/86	0.830000	20.0000 BE	Y	8.00	0	1.40	0
ET SD04	METALS/WATER/GFAA	WA	UGL	C1	09/29/86	1.500000	20.0000 PB	Y	1.50	1	3.00	0
ET SD04	METALS/WATER/GFAA	WA	UGL	C1	09/29/86	7.000000	50.0000 SB	Y	7.00	1	1.40	1
ET SD04	METALS/WATER/GFAA	WA	UGL	C1	09/29/86	1.700000	20.0000 TL	Y	1.00	1	2.00	0
ET SE01	METALS/WATER/HYAA	WA	UGL	C1	09/29/86	2.450000	40.0000 AS	Y	2.50	1	5.00	0
ET SE01	METALS/WATER/HYAA	WA	UGL	C1	09/29/86	2.550000	50.0000 SE	Y	2.50	1	5.00	0
ET SS02	METALS/WATER/ICPLASMA	WA	UGL	C1	11/25/86	3.400000	200.0000 BA	Y	3.00	1	4.00	0
ET SS02	METALS/WATER/ICPLASMA	WA	UGL	C1	11/25/86	11.900000	1000.0000 CD	Y	1.00	2	2.00	1
ET SS02	METALS/WATER/ICPLASMA	WA	UGL	C1	11/25/86	10.800000	900.0000 CR	Y	1.00	2	2.00	1
ET SS02	METALS/WATER/ICPLASMA	WA	UGL	C1	11/25/86	21.500000	200.0000 CU	Y	2.00	2	4.00	1
ET SS02	METALS/WATER/ICPLASMA	WA	UGL	C1	11/25/86	65.200000	400.0000 NI	Y	4.00	2	1.20	2
ET SS02	METALS/WATER/ICPLASMA	WA	UGL	C1	11/25/86	14.500000	700.0000 ZN	Y	4.00	2	8.00	1
ET TF02	ANIONS/WATER/TECHNICON	WA	UGL	C1	10/07/86	244.000000	2000.0000 BR	Y	2.00	3	5.00	2
ET TF03	ANIONS/WATER/TECHNICON	WA	UGL	C1	10/07/86	5000.000000	150000.0000 CL	Y	5.00	4	1.00	4
ET TF04	ANIONS/WATER/TECHNICON	WA	UGL	C1	09/23/86	4750.000000	750000.0000 SD4	Y	5.00	4	1.00	4
ET TF04	ANIONS/WATER/TECHNICON	WA	UGL	C1	09/23/86	29.500000	500.0000 CYN	Y	2.50	2	5.00	1
ET TF04	ANIONS/WATER/TECHNICON	WA	UGL	C1	09/23/86	56.900000	1000.0000 PHENLC	Y	5.00	2	1.00	3
ET TF07	PHENOLS/WATER/TECHNICON	WA	UGL	C1	09/23/86	870.000000	3000.0000 PHENLC	Y	4.00	3	2.00	3
ET TF08	ANIONS/WATER/TECHNICON	WA	UGL	C1	10/07/86	24.000000	2000.0000 NIT	Y	5.00	2	5.00	1
ET TU01	ANIONS/WATER/ELECTRODE	WA	UGL	C1	08/12/86	360.000000	10000.0000 F	Y	5.00	3	1.00	3
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.170000	1.2500 ABHC	N	1.50	0	3.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.150000	1.2500 ALDRN	Y	1.50	0	3.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.250000	2.5000 DLDNR	Y	3.00	0	6.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.500000	2.5000 ENDRN	Y	3.00	0	6.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.160000	1.2500 MPCL	N	1.50	0	3.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.130000	1.2500 LIN	Y	1.50	0	3.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	1.300000	12.5000 PCB016	Y	1.50	1	2.60	0
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	2.500000	25.0000 PCB260	Y	2.50	1	5.20	0
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.270000	2.5000 PFDDC	N	1.50	0	3.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.270000	2.5000 PFDDC	N	1.50	0	3.00	-1
ET UH01	PESTICIDES/WATER/GCEC	WA	UGL	C1	12/16/86	0.270000	2.5000 PFDDT	Y	1.50	0	3.00	-1
ET UH01	ORGANOPHOSPHO/WATER/GCFF	WA	UGL	C1	07/04/87	25.500000	40.5000 DIMP	Y	4.00	1	3.00	1
ET UL01	ORGANOSULFURS/WATER/GCFF	WA	UGL	C1	12/29/86	45.400000	100.0000 CPMS	Y	1.00	2	8.00	1
ET UL01	ORGANOSULFURS/WATER/GCFF	WA	UGL	C1	12/29/86	79.600000	100.0000 CPMS	Y	1.00	2	1.00	2
ET UL01	ORGANOSULFURS/WATER/GCFF	WA	UGL	C1	12/29/86	50.800000	100.0000 CPMS02	Y	1.00	2	6.00	1
ET UM01	VOLATILES/WATER/GCMS	WA	UGL	1A	07/14/86	4.800000	200.0000 12DCD4	Y	5.00	1	0.00	0
ET UM01	VOLATILES/WATER/GCMS	WA	UGL	1A	07/14/86	8.100000	50.0000 48FB	Y	5.00	1	0.00	0
ET UM01	VOLATILES/WATER/GCMS	WA	UGL	1A	07/14/86	6.700000	50.0000 CDCL2	Y	5.00	1	0.00	0
ET UM01	VOLATILES/WATER/GCMS	WA	UGL	1A	07/14/86	5.800000	400.0000 ETBD10	Y	5.00	1	0.00	0
ET UM01	VOLATILES/WATER/GCMS	WA	UGL	1A	07/14/86	1.500000	200.0000 MEC6DB	Y	5.00	1	0.00	0
ET UM01	VOLATILES/WATER/GCMS	WA	UGL	1A	07/14/86	1.900000	200.0000 TRCLE	N	5.00	1	0.00	0